MAR. 14 1958

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

Crude Reserves Trend in 1957
(in millions of bbl.)

All U.S.	−134.2
Ala.	−3.1
Ark.	−12.8
Calif.	−11.6
Colo.	−53.8
Ill.	−45.3
Ind.	−1.0
Kan.	−44.7
Ky.	−10.4
La.	+182.1
Mich.	−5.8
Miss.	−8.7
Mont.	−11.4
Neb.	+0.2
N. M.	−3.7
N. Y.	−2.7
N. D.	+62.4
Ohio	+4.6
Okla.	−68.3
Pa.	−8.2
Texas	−228.0
Utah	+78.6
W. Va.	+1.3
Wyo.	+56.6
Misc.	−0.6

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Price 50 Cents

Misc. —0.6

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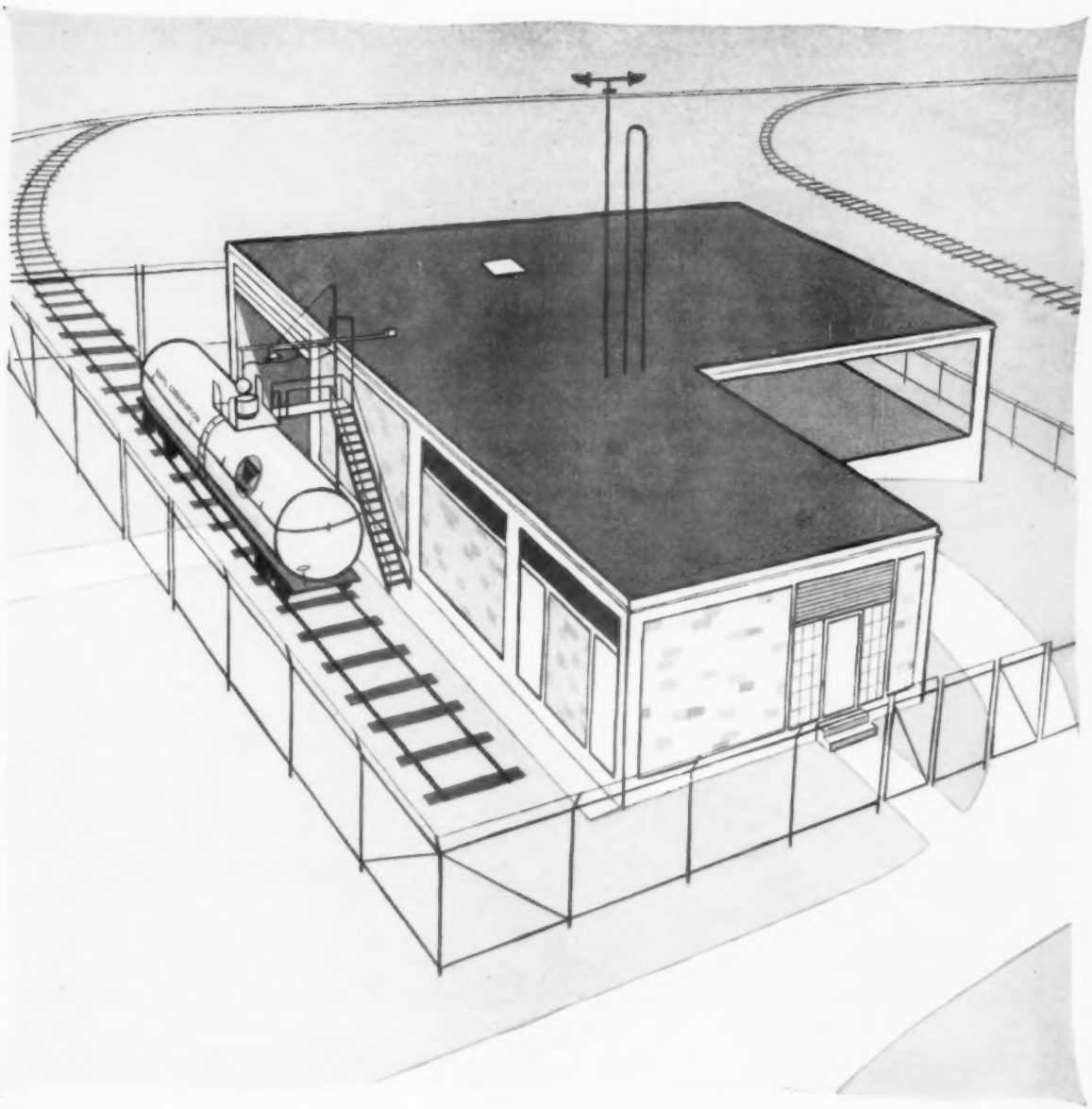

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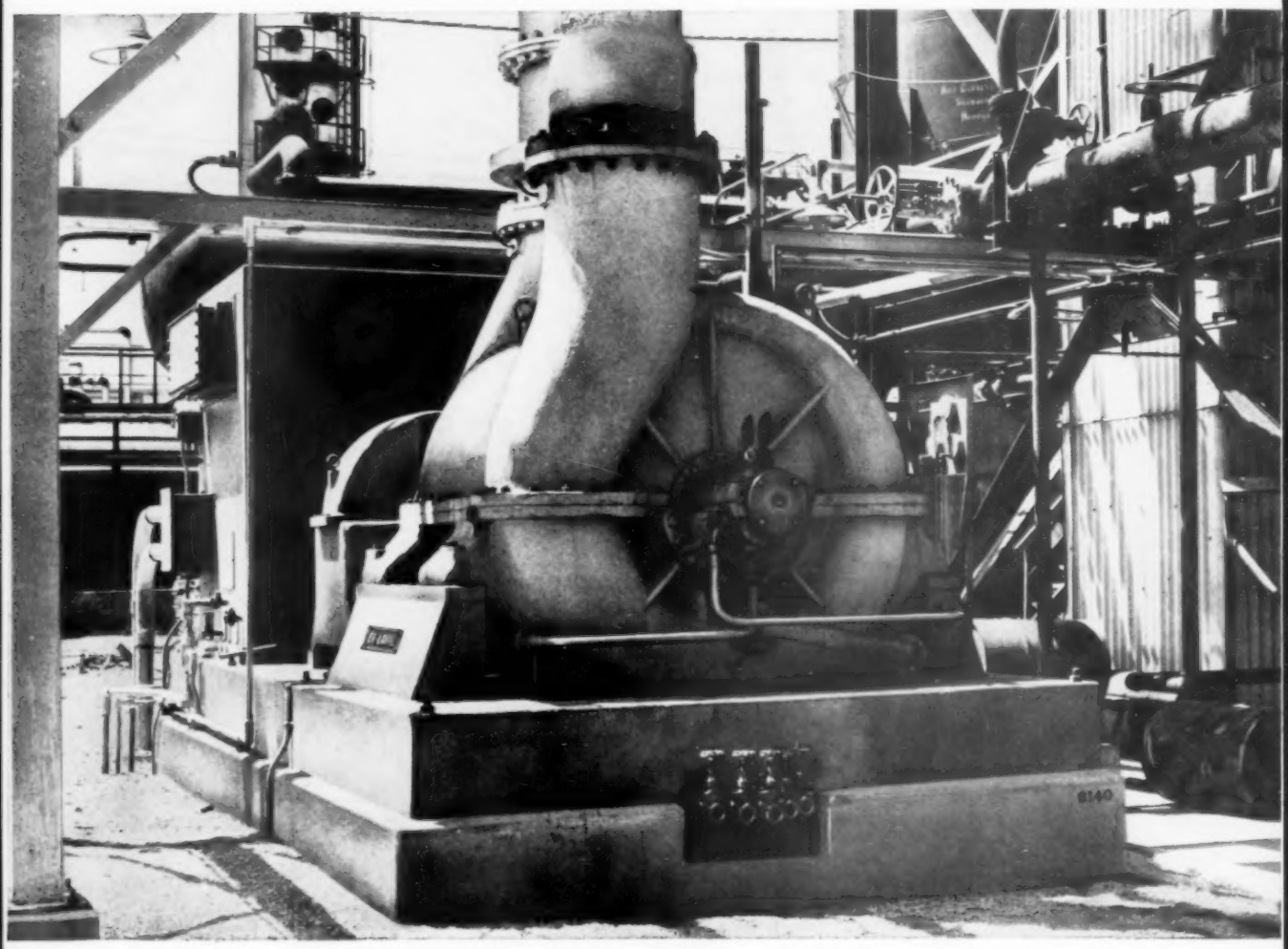

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60-Second Summary / WHAT'S HAPPENING IN OIL

AT-A-GLANCE PETROLEUM WEEK Copyright

March 14, 1958

Reserves of petroleum liquids and exploratory drilling both declined in the U.S. last year, the first noticeable dip in 24 years. Too, the discovery rate per wildcat foot was at a postwar low (page 64). Natural gas reserves continued upward, but the gain was less than in the preceding two years. Canadian reserves rose, with increased drilling. . . . p. 11

•

Each major marketing area has its own price cut "leader" this week. The East Coast and Midwest are featuring distillates, the Gulf Coast, gasoline, and the West Coast, residual fuel oil. . . . p. 60

•

Aerial color photography may become an exploration tool. It offers the advantage of showing structural features in a different shade from surrounding terrain. . . . p. 28

•

Now that one heating season is drawing to a close, oil-heat marketers are pushing for the next one. They're making an all-out drive to add new customers in the face of stiff competition from gas. . . . p. 54

•

Rugged terrain, which slowed building of the Four Corners crude line to California, aids its microwave system. The high elevations make for stronger signals. . . . p. 44

•

Barinas is Venezuela's "hot" oil area, with wellhead temperatures up to 237F. But as for new discoveries, the area isn't proving to be so hot. Increased wildcatting so far hasn't added new pools to the three original discoveries. . . . p. 48

•

A growing volume of natural gas liquids will enter petrochemical markets. New techniques for recovery and fractionation may be required to provide raw materials. And natural gasoline may eventually become major raw material. . . . p. 38

•

The Dakota and Gallup formations in the San Juan Basin may be in for heavy drilling in the future. That was predicted at an API production meeting this week. . . . p. 20

•

The entry of U.S. firms will boost exploration in the Sahara this year. Cities Service and Phillips Petroleum already have rights there. They will be joined soon by Sinclair and Newmont Mining. Others may come in soon. . . . p. 50

•

"Refining value" continues to be an important consideration in new postings for crude. Price penalties are being imposed on the low-value, high-gravity crudes and condensate that yield large volumes of low-octane gasoline. . . . p. 17

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Up to the Minute / SIGNIFICANT LATE NEWS

AT-A-GLANCE PETROLEUM WEEK Copyright

March 14, 1958

The State Dept. is now playing a key role in the oil imports control issue. Disturbed by the possible impact of mandatory controls on U. S. relations with Canada and Venezuela, State Dept. officials are trying to work out alternate solutions. A series of top-level discussions are being held with the Canadians and Venezuelans.

A "Western Hemisphere" approach is under study. Several proposals are being considered, including this one: Canada would be granted specific exemptions as a national security measure. Venezuela would be permitted to increase her shipments of asphaltic crude to the U. S.

If a course of this type is adopted, controls may continue to be "voluntary." If so, an attempt will be made to make the controls tougher, and to block loopholes. The Administration, on the verge of applying mandatory controls (page 16), would like to avoid doing so if an acceptable voluntary plan jells. For one thing, it fears mandatory action by the President would be challenged as illegal. This could result in no controls. And a congressional law would mean a cumbersome bureau operation.

No definite plan is expected for about two weeks, although a preliminary announcement may be made sooner to slow the drive in Congress.

One thing is certain: Some changes are coming. The Administration is convinced that it cannot continue with the present voluntary plan unchanged.

•

Some West Texas producers have escaped a 50¢ price cut. When Eastern States recently dropped its posting on West Texas sour crude to $2.40 a bbl., about one-third of the producers affected were able to dispose of their crude elsewhere at the going price of $2.90. In several cases, major producers picked up their own oil. Net result: Eastern States has lost about 2,000 b/d of the 5,400 b/d involved.

•

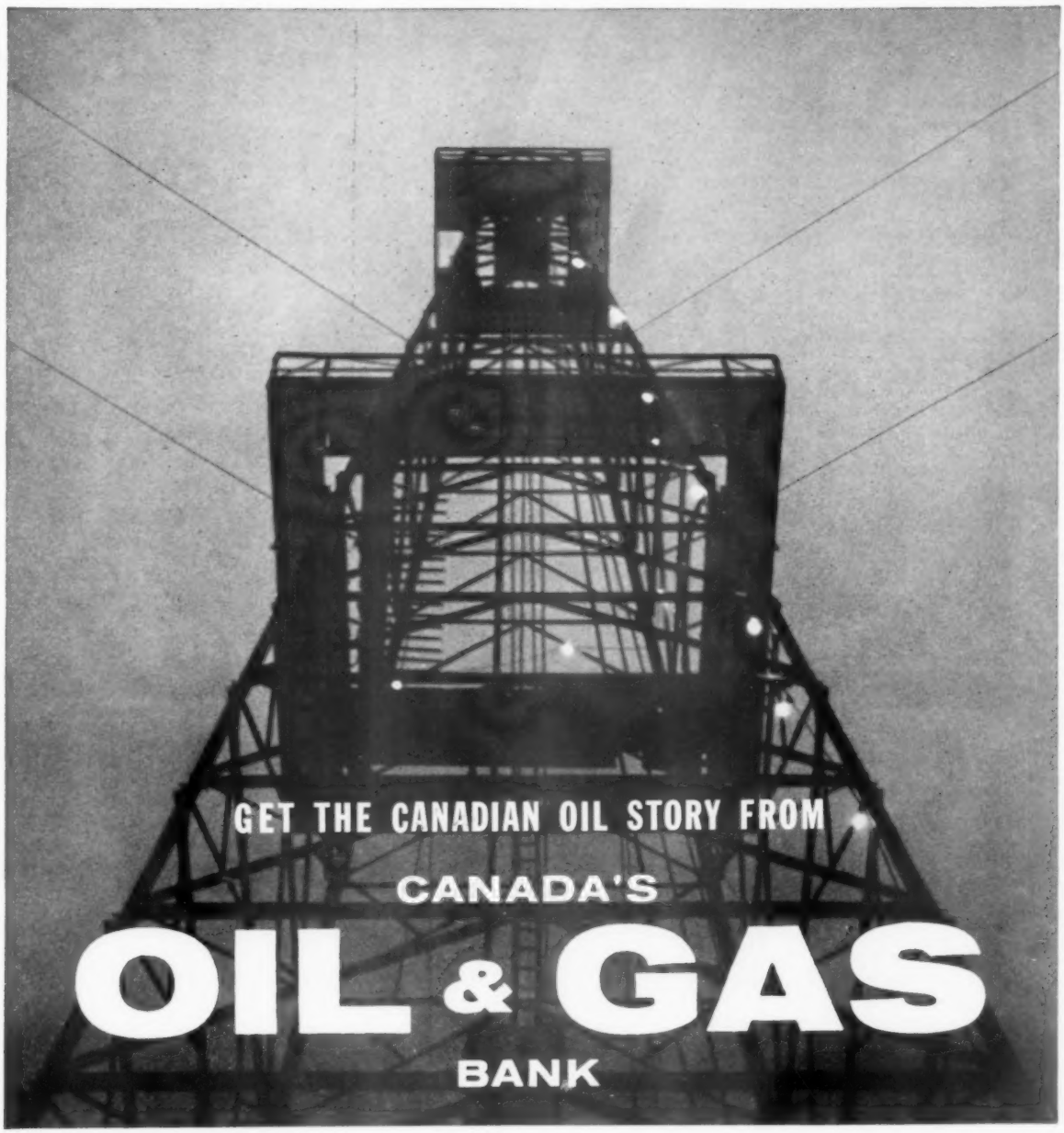
The Borden Commission is likely to approve gas exports to the U. S. Midwest. That was indicated during the Canadian group's recent round of hearings. Other proposed exports to the U. S. may also get favorable consideration, after a close scrutiny of contract terms and prices. However, the commission's report may be delayed until after the upcoming Canadian elections.

•

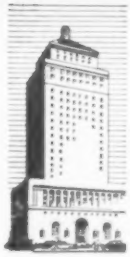
Fighting in Indonesia has snarled oil work there. Oil shipments, which usually run about 315,000 b/d, have been cut to about 165,000 b/d.

Caltex, Indonesia's leading producer, has shut down its 150,000 b/d producing operations, and has suspended shipments. Stanvac's shipments from its 15,000 b/d Lirik field also were halted by army occupation of the river terminal into which its pipeline outlet feeds. Royal Dutch Shell work in South Sumatra, outside the conflict, hasn't been hit.

Assurances have been given that oil installations will not be damaged, nor the lives of the oil company personnel endangered.



If you are interested in Canada's expanding oil and gas industry, you will find the Royal's *Special Bulletin Service* of value. These bulletins, issued by our Oil and Gas Department, are frequently revised and contain information on all important aspects of the industry—regulations, tariffs, financing, statistics and kindred topics. For a list of current bulletins, write The Royal Bank of Canada, Oil and Gas Dept., 409 Eighth Ave. W., Calgary, Alta.



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Nearly every refinery finished product is benefiting from one of the Duomeens or their derivatives: aviation gasolines, jet fuels, automobile gasolines, #2 fuel oils, diesel oils, lube oils and a variety of greases—to name a few.

The Duomeens function in many ways in the finished products. They are used as outstanding corrosion inhibitors in gasolines, lube oils and greases. They have few equals when used as sludge inhibitors in various fuels and oils. Then too, many oil companies are putting Duomeens into hi-pressure oils and greases where they act as pressure lubricants and oiliness agents. The Duomeens also function as de-icers in gasolines.

The Duomeens are dipolar . . . $R(NH)CH_2CH_2CH_2(NH_2)$ . . . organic surface active agents. They have adsorption characteristics which enable them to form organophilic or hydrophobic films on metal surfaces when used alone—or when reacted with organic or inorganic acids. Reacted, they give varying degrees of water and/or oil solubility, depending on the requirement.

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Chemical and Physical Properties

	Duomeen C		Duomeen T		Duomeen S	
	Min.	Max.	Min.	Max.	Min.	Max.
Iodine Value	5	15	32	50	50	
% Active Duomeen	83		83		83	
Primary Amine	35	45	35	45	35	45
Secondary Amine	38		38		38	
Moisture %		1		1		1
Color—FAC		19		19		13
Melting Point 25°C	20	24	38	43	33	38
Combining Weight	304	311	377	386	378	387
Appearance @ 25°C	Liquid		Soft Paste		Heavy Liquid	
Specific Gravity @ 25°C	0.836		0.841		0.846	
Viscosity @ 25°C	10 cps.		880 cps.		70 cps.	
Viscosity @ 30°C	—		70 cps.		40 cps.	
Viscosity @ 35°C	—		10 cps.		10 cps.	

These chemicals have passed industry-wide specification tests such as the steam turbine test, the salt water spray test and others.

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Dip in Reserves Breaks Long Trend

Exploratory Drilling dropped 9% last year to 14,707 tests, and new crude reserves found per foot drilled hit a new low of 10.7 bbl.

Year	Total Exploratory Drilling	Crude Reserves End of Year (thous. bbl.)
1938	2,638	17,348,146
1939	2,702	18,483,012
1940	3,038	19,024,515
1941	3,264	19,589,296
1942	3,212	20,082,793
1943	4,008	20,064,152
1944	4,796	20,452,231
1945	5,613	20,826,813
1946	5,759	20,873,560
1947	6,775	21,487,685
1948	8,013	23,280,444
1949	9,058	24,649,489
1950	10,306	25,268,398
1951	11,756	27,486,031
1952	12,425	27,960,554
1953	13,313	28,944,828
1954	13,097	29,560,746
1955	14,937	30,012,170
1956	16,173	30,435,649
1957	14,707	30,300,405

Drilling data from American Assn. of Petroleum Geologists.
Reserves data from American Petroleum

The search for and discovery of liquid hydrocarbons in the U.S. declined last year. The downturn broke a trend that has, with one minor exception, been steadily upward for almost a quarter of a century.

The drop in exploratory activity came during a year when demand for U.S. oil was at an all-time high. And the result was that the nation's proved supply of all petroleum liquids in the ground declined to only a 12.4-year supply at the end of 1957, the lowest since 1948.

It marked the fourth consecutive year that the ratio of year-end reserves to annual production declined.

• The nation's crude reserves were estimated at 30,300,405,000 bbl. at the end of 1957, a net decline (after production) of 134,244,000 bbl. And, though the proved reserves still were higher than in any previous year except for 1956, the decline of 0.4% was the first measurable drop since 1933.

The only other decline in the past 24 years came in 1943. The drop then, amounting to only 18.6-million bbl. from the previous year, was due entirely to the wartime steel shortage.

• Total reserves of petroleum liquids — crude plus natural gas liquids—declined 349,216,000 bbl. to 35,987,765,000 bbl.

The larger decline for total hydrocarbon liquids, amounting to 0.9%, was due to a 3.6% drop in reserves of natural gas liquids. It was the largest decline ever recorded for gas liquids and the second in four years.

Previously, natural gas liquids reserves declined by 193.5-million bbl. in 1954, almost as large as last year's drop of nearly 215-million bbl.

• Natural gas reserves, on the other hand, increased 8.8-trillion cu. ft. to a record high of 246.6-trillion cu. ft. The rise in natural gas reserves last year, however, was not nearly so great as the increases in the two preceding years.

The 1957 statistics on reserves were reported this week by the joint committee on reserves of the American Petroleum Institute and the American Gas Assn.

And also this week, the committee on statistics of exploratory drilling of the American Assn. of Petroleum Geologists reported its findings on exploratory drilling in the U.S. last year, which provided the reason why domestic reserves fared so poorly in 1957.

Footage Declined 6.6%

The decline in liquid petroleum reserves was due to a sharp reduction in exploratory drilling, and to a further decline in the actual reserves found per foot of exploratory hole drilled, to a new low of 10.7 bbl.

A total of 14,707 exploratory tests

Estimated Crude Reserves in U.S.

(In thousands of barrels)

	Proved Reserves 12/31/56	Extensions and Revisions 1957	New Discoveries 1957	Production 1957	Net Changes in Reserves 1957	Proved Reserves 12/31/57
Ala.	37,537	3,301	—	6,429	— 3,128	34,409
Ark.	317,726	14,593	2,271	29,631	— 12,767	304,959
Calif.*	3,771,357	312,412	15,060	339,075	— 11,603	3,759,754
Colo.	363,750	— 1,577	2,645	54,879	— 53,811	309,939
Ill.	700,000	23,765	7,172	76,191	— 45,254	654,746
Ind.	67,728	10,585	241	11,818	— 992	66,736
Kan.	992,211	65,399	13,654	123,780	— 44,727	947,484
Ky.	148,442	4,361	2,541	17,304	— 10,402	138,040
La.*	3,675,419	376,360	104,259	298,469	+182,150	3,857,569
Mich.	55,312	2,273	2,182	10,275	— 5,820	49,492
Miss.	368,205	18,590	9,697	36,942	— 8,655	359,550
Mont.	331,414	14,628	940	26,991	— 11,423	319,991
Neb.	62,861	11,821	8,038	19,661	+ 198	63,059
N. M.	835,437	76,992	11,750	92,435	— 3,693	831,744
N. Y.	40,196	—	—	2,663	— 2,663	37,533
N. D.	195,834	19,083	56,340	13,036	+ 62,387	258,221
Ohio	63,575	10,128	—	5,553	+ 4,575	68,150
Okla.	2,009,798	125,181	17,989	211,447	— 68,277	1,941,521
Pa.	134,700	—	—	8,210	— 8,210	126,490
Texas*	14,783,139	699,718	129,541	1,057,258	—227,999	14,555,140
Utah	61,435	61,572	21,635	4,608	+ 78,599	140,034
W. Va.	51,221	3,539	—	2,215	+ 1,324	52,545
Wyo.	1,363,164	155,884	10,192	109,522	+ 56,554	1,419,718
Misc.	4,188	— 5	50	652	— 607	3,581
Total U.S.	**30,434,649**	**2,008,603**	**416,197**	**2,599,044**	**—134,244**	**30,300,405**

*Includes offshore reserves.

Liquid Hydrocarbons Reserves in U.S.

(in thousands of barrels)

	Proved Reserves 12/31/56	Extensions and Revisions 1957	New Discoveries 1957	Production 1957	Net Changes in Reserves 1957	Proved Reserves 12/31/57
Ala.	37,537	3,301	—	6,429	— 3,128	34,409
Ark.	360,193	12,092	2,360	32,546	— 18,094	342,099
Calif.*	4,083,085	335,497	15,645	368,744	— 17,602	4,065,483
Colo.	375,295	— 1,404	2,725	55,712	— 54,391	320,904
Ill.	716,772	20,510	7,172	77,915	— 50,233	666,539
Ind.	67,861	10,582	246	11,839	— 1,011	66,850
Kan.	1,163,826	87,097	15,845	130,129	— 27,187	1,136,639
Ky.	155,693	4,636	2,679	19,261	— 11,946	143,747
La.*	4,690,361	365,780	166,154	345,528	+186,406	4,876,767
Mich.	56,380	2,519	2,201	10,371	— 5,651	50,729
Miss.	424,208	19,606	10,095	39,958	— 10,257	413,951
Mont.	339,559	14,615	940	27,318	— 11,763	327,796
Neb.	69,365	13,185	8,116	20,472	+ 829	70,194
N. M.	1,249,536	— 5,578	16,093	107,759	— 97,244	1,152,292
N. Y.	40,196	—	—	2,663	— 2,663	37,533
N. D.	214,834	19,083	61,340	14,336	+ 66,087	280,921
Ohio	65,244	10,272	16	5,572	+ 4,716	69,960
Okla.	2,365,386	132,515	31,807	245,544	— 81,222	2,284,164
Pa.	137,867	261	131	8,309	— 7,917	129,950
Texas*	18,163,028	751,474	168,496	1,256,241	—336,271	17,826,757
Utah	61,530	61,572	21,635	4,612	+ 78,595	140,125
W. Va.	77,962	4,337	266	7,108	— 2,505	75,457
Wyo.	1,417,038	155,538	10,693	112,386	+ 53,845	1,470,883
Misc.	4,225	— 3	50	656	— 609	3,616
Total U.S.	**36,336,981**	**2,017,487**	**544,705**	**2,911,408**	**—349,216**	**35,987,765**

*Includes offshore reserves.

Estimated U.S. Natural Gas Reserves

(Millions of cu. ft.—14.65 psia. at 60F)

	Proved Reserves 12/31/56[b]	Extensions and Revisions[b]	New Discoveries[b]	Net Change in Underground Storage[c]	Net Production[d]	Proved Reserves 12/31/57[b]
Ark.	1,171,527	103,994	47,818	145	40,462	1,283,022
Calif.[e]	8,751,233	516,043	144,989	12,616	471,988	8,952,893
Colo.	2,422,769	40,381	55,244	1,385	139,100	2,380,679
Ill.	219,705	— 36,175	0	2,085	19,243	166,372
Ind.	33,772	0	270	950	4,040	30,952
Kans.	17,566,257	2,136,392	218,473	565	625,709	19,295,978
Ky.	1,245,602	43,714	7,640	— 2,911	69,000	1,225,045
La.[e]	45,053,999	4,137,189	4,366,891	0	2,122,125	51,435,954
Mich.	361,786	46,625	1,750	44,015	10,148	444,028
Miss.	2,403,326	70,809	28,983	462	205,840	2,297,740
Mont.	696,351	649	957	4,324	31,831	670,450
Neb.	225,402	— 9,014	1,734	0	28,783	189,339
N. M.	23,472,707	—684,776	215,588	— 1,684	743,826	22,258,009
N. Y.	85,249	3,200	800	7,249	3,116	93,382
N. D.	397,493	193,105	170,232	0	17,398	743,432
Ohio	853,607	49,900	8,850	21,710	32,261	901,814
Okla.	13,775,049	577,123	839,797	12,080	944,569	14,259,480
Pa.	776,212	141,521	14,880	27,986	107,004	853,595
Texas[e]	112,728,750	3,197,704	2,665,334	11,506	5,518,776	113,084,518
Utah	619,786	192,436	65,154	0	18,082	859,294
Va.	35,557	3,375	1,125	0	2,536	37,521
W. Va.	1,561,737	131,686	27,960	23,524	183,977	1,560,930
Wyo.	3,235,932	261,026	113,798	796	154,119	3,457,433
Misc.[a]	80,761	1,412	726	12,922	8,426	87,395
Total U.S.	**237,774,569**	**11,118,319**	**8,998,993**	**179,733**	**11,502,359**	**246,569,255**

(a) Includes Alabama, Arizona, Florida, Iowa, Maryland, Missouri and Nevada.
(b) Excludes gas loss due to natural gas liquids recovery.
(c) The net difference between gas stored in and gas withdrawn from underground storage reservoirs, inclusive of adjustments and native gas transferred from other reserve categories.
(d) Net production equals gross withdrawals less gas injected into producing reservoirs. Changes in underground storage and gas loss due to natural gas liquids recovery are excluded. Fourth quarter production estimated in some instances.
(e) Includes offshore reserves.

of all types—new-field wildcats, new-pool tests, deeper-pool tests, shallower-pool tests, and outposts—were drilled in the U.S. and Alaska, 9% fewer than in 1956. The total footage in all exploratory tests was 69.1-million ft., or 6.6% less than in 1956.

The new-field wildcats drilled totaled 8,014, off 8% from 1956. Total footage drilled in new-field tests was 39.1-million, off 7% from 1956.

The success ratio last year was about the same as in the preceding year. Of the new field wildcats, 10.88% were successful, compared with 9.97% in 1956. And 19.11% of the total exploratory tests were successful, compared with 19.13% in 1956.

But the successful tests found less total oil per foot drilled than in any previous year, as the ratio of reserves discovered per foot of strict wildcats drilled continued to decline sharply. This decline has been going on ever since the postwar peak of 49 bbl. per ft. in 1949.

The decline in footage of strict wildcat tests for petroleum liquids last year corresponded almost exactly with the drop in new reserves found.

According to the API-AGA reserves committee study, new discoveries in 1957 totaled 416,197,000 bbl., or 51,025,000 bbl. less than in 1956.

And according to the AAPG exploratory drilling committee study, strict wildcat footage in the search for oil (excluding tests that found gas) declined 4,834,100 ft.

On the basis of the 10.7 bbl. of new oil reserves found per foot drilled in 1957, the decline in footage was equivalent to 51.7-million bbl. of oil that wasn't found.

The primary reasons for the decline in drilling last year were the lower-than-expected demand and the high volume of imported oil.

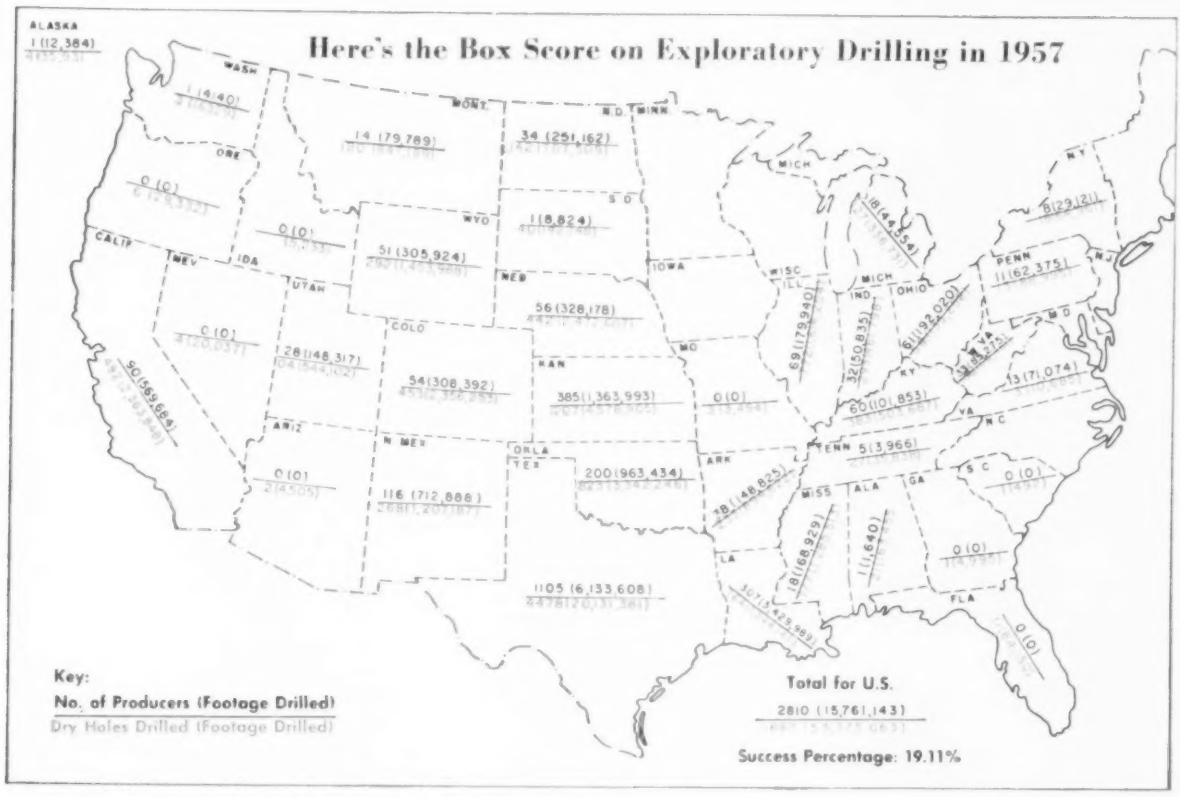
Both factors resulted in the necessity for sharp curtailment of domestic crude production, greatly reducing income to producers.

And based on the indicated drilling activity so far in 1958, the current year's total exploratory effort may show no significant change for 1957.

The last time both reserves and exploratory drilling showed a decline—other than during the wartime steel shortage—came in 1933.

That was also a time when imports were a major problem, and had been for three years. And in each of those years—'31, '32, and '33—U.S. crude reserves declined.

In fact, it wasn't until 1937 that U.S. crude reserves topped the volume that had been reported for Dec. 31, 1930.



The one bright spot in the overall picture of liquid petroleum reserves was the improvement in the ratio of actual new discoveries found by drilling to total new reserves, which include the so-called "pencil" additions to reserves.

The "pencil" reserves are the revisions of previous estimates made by the joint API-AGA committee each year. They also include extensions to known fields.

The reason such revisions are used is that each year the committee assigns only a small portion of the ultimate reserves of a pool or field to each new discovery. The actual amount of reserves initially assigned depends primarily on the geology of the area.

As a new area is developed, additional reserves are assigned to it—the amount, of course, depending on the results of subsequent drilling.

In recent years, though, the pencil additions have accounted for an increasing share of the total volume of added reserves reported.

But last year new discoveries accounted for 17.2% of the new reserves, up nearly two full percentage points over 1956 and slightly above the postwar average ratio of 16.9%.

Louisiana Reserves Up

Louisiana, aided by its offshore reserves, was the only major producing state to show a gain in crude reserves last year. And only six of the smaller producing states had net gain in reserves (table, page 11).

Louisiana, which has had a net gain in reserves in each of the postwar years, added 182,150,000 bbl. to its reserves last year. But the increase last year was less than half as large as the record net gain of 420.1-million bbl. in 1956.

Louisiana, the third ranking producing state after Texas and California, produced 11.7% of the U.S. crude last year. But its reserve position at the end of the year was unchanged from a year earlier, at 12.7% of total U.S. crude reserves.

Utah, which now only produces 17,000 b/d, outstripped all other states in percentage addition to reserves. It more than doubled its proved reserves last year.

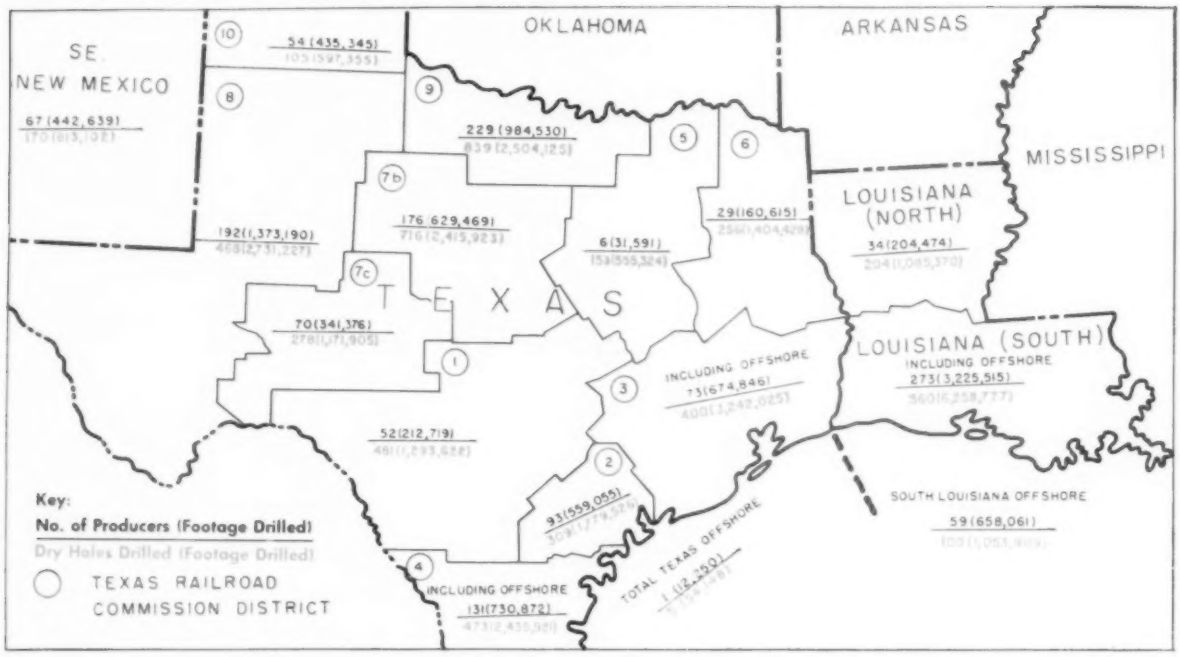
The actual gain in reserves was 78,599,000 bbl., amounting to 126%.

This was accompanied by a 39% hike in total exploratory drilling in the state, with 132 tests.

The 17 tests that resulted in new oil producers accounted for 21.6-million bbl. of the total increase before production (map, page 13).

The year's results weren't as good as in 1956, when 22 tests resulted in new oil producers. But development of the previous discoveries ac-

How Southwest Fared, by District, in Its '57 Drilling



counted for the remaining 61.6-million bbl. of the gain in reserves.

Other gains in reserves were made in Nebraska, North Dakota, Ohio, West Virginia, and Wyoming.

Texas, with a 21-million bbl. decline in oil production last year, had a 228-million drop in reserves—the fifth year out of the last six that the state has produced more oil than was found.

The state's production last year accounted for 41% of the U.S. total, one percentage point less than in 1956. But its reserves held at 48% of the U.S. total.

Total exploratory drilling in Texas last year declined 10.5%, to 5,583 tests. And the successful oil discoveries declined 20.7%, to 758.

Only six states recorded gains in reserves of total liquid hydrocarbons last year.

Louisiana had the largest volume gain in reserves of total petroleum liquids—186.4-million bbl. It was joined by Nebraska, North Dakota, Ohio, Utah, and Wyoming (table, page 12).

All producing states except Illinois and Nebraska reported gains in natural gas reserves, even though the number of new gas discoveries declined slightly from 1956 and production was 5% higher. (Table, page 12).

Of the exploratory tests drilled last year, 550 discovered gas, compared with 572 in 1956. But nearly as much footage was drilled (2,843,707 vs. 2,854,671) in gas wells.

Smaller Gain in Canada

In Canada, both reserves of petroleum liquids and exploratory drilling increased in 1957, though the gain in total reserves was only half that of the previous year.

Estimates of the Canadian Petroleum Assn. place liquid hydrocarbon reserves at the end of 1957 at 3,269,114,000 bbl., a gain of 139,810,000 bbl. In 1956, the increase amounted to 372,685,000 bbl.

B. W. BLANPIED is chairman of the American Assn. of Petroleum Geologists' Committee on Statistics of Exploratory Drilling, which supplied the drilling data in this story. Blanpied is staff geologist of Gulf Oil Corp.'s Houston division.

Crude reserves at the end of the year were estimated at 2,874,454,000 bbl., up 25,084,000 bbl. over 1956—compared with a gain of nearly 340-million bbl. the previous year.

A total of 1,209 exploratory tests were drilled in Canada in 1957, up 156 over 1956. But only 176 tests discovered oil, compared with 194 oil discoveries in 1956.

The gain in Canadian crude reserves last year resulted from increases in only two provinces—Saskatchewan and Ontario. Alberta had a decline of 28,363,000 bbl. in net reserves.

Saskatchewan's crude reserves jumped 61,764,000 bbl., to 42,457,000 bbl.—even though the number of oil discoveries declined to 55 from 90 in 1956. The new reserves added by discoveries totaled 5,982,000 bbl., while extensions and revisions accounted for a 90,827,000-bbl. gain (both computed before deducting production).

Ontario, which had 46,000 bbl. added to new reserves as a result of two oil discoveries, had a net gain in reserves of 239,000 bbl.

In Alberta, there were more oil discoveries than in 1956—109 vs. 95. But with a gain in production, and an apparent decline in the oil-finding rate, net reserves dropped to 2,360,933,000 bbl. at the end of 1957.

Refinery Lures Tourists

Using a "Be Our Guest" theme, Gulf Oil Corp. has launched a campaign to turn its 270,000 b/d Port Arthur (Tex.) refinery into, literally, a tourist attraction.

The big plant is located on a new Houston-to-New Orleans highway that will be finished soon. A north-south highway forms a junction practically at the refinery.

Right now, visitors include chiefly employees from other phases of Gulf company activity and school children.

But Gulf is just starting to make a dead serious attempt to "put the refinery on the map" as a regular, worthwhile tourist attraction, just as enjoyable and educational to visit as forests, monuments, historical spots, etc.

The company is even studying the possibility of painting refinery units different pastel colors to add to its appearance.

No. 1 "tool" for the project is a bright folder, featuring the Gulf blue and orange, which describes the plant operation.

Some 26,000 copies of the folder have been printed. Of these, 16,000 are at the refinery, to be handed to visitors.

The others are being sent to other Gulf refineries to aid in answering queries, and are being distributed widely in the Port Arthur area.

In a simplified pictorial sketch, the folder shows the flow of crude from the field through the various refining processes.

A collection of factual and descriptive data on refining in general, and the Gulf Port Arthur refinery in particular, are covered in text.

But the folder goes further. It tells, briefly, the story of oil in general. And it introduces the visitor to the average Gulf refinery worker.

In addition, each visitor is given material from OIC, various oil trade association, etc., to help him learn something about the industry and what it means to him and to the country.

There is no top-heavy staff involved in the program.

At least up to now, Gulf is utilizing only one full-time guide, and one bus and driver.

One of the more interesting aspects of the tour is the opportunity for the visitor to see for himself the contrast between refining units used just after the turn of the century and such modern giants as the plant's fluid cat cracker, which has a 2-million-gal. daily capacity.

Each tour is slanted somewhat to the type of group making the visit. For example, a sixth-grade class will be told how important Gulf feels it is for a student to continue his education in order to fit into such a complex industry as oil.

A class of college students receives a more technical explanation of plant operations.

Tourists will be given a broader picture of the industry and its relation to the well-being of the nation.

Gulf realizes that the program can help the company. But, just as important, it hopes that making a refinery tour a pleasant and informative experience will make friends for the industry.

Stripper Wells Show Gains

The latest national stripper well survey shows a slight increase in the number of such wells, and in total production from them.

The survey was released by the Interstate Oil Compact Commission this week.

The figures for Jan. 1, 1957—the base date for the survey—show that there were 370,489 stripper wells at that time. A year earlier, there were 357,931.

Total production was 485,636,910 bbl., compared with 467,101,646 the previous year, due to an increase in the number of such wells.

There were fewer abandonments —8,996 wells—than in 1955, when there were 9,968.

The average production per stripper well was 3.59 b/d. In the survey a year earlier, the average was 3.58 b/d.

Reserves—primary and secondary—increased over 100,000,000 bbl. to a total of 7,946,676,000.

Total acreage involved was 4,837,238, an increase of about 250,000 acres over Jan. 1, 1956.

(in thousands of barrels)

	No. of Stripper Wells	1956 Production From Strippers	Avg. Production Per Well (b/d)	Secondary Reserves	Total Primary and Secondary
Ark.	3,967	8,492	5.86	21,736	175,323
Calif.	20,496	56,363	7.53	560,650	1,118,170
Colo.	159	407	7.02	0	16,780
Ill.	30,766	80,718	6.31	*	875,600
Ind.	4,250	11,351	7.32	40,700	90,710
Kan.	29,445	46,887	4.36	77,625	403,995
Ky.	14,166	13,389	2.59	60,000	105,000
La.	7,874	14,168	4.93	50,000	162,515
Mich.	3,474	10,739	8.47	67,936	126,392
Miss.	228	418	5.02	—	3,335
Mo.	129	65	1.38	—	615
Mont.	2,986	4,836	4.44	106,542	145,880
Neb.	55	235	11.72	—	1,565
N. M.	3,859	5,557	3.95	64,920	106,420
N. Y.	23,500	2,687	.37	50,200	129,200
N. D.	12	24	5.40	—	—
Ohio	14,057	4,923	.96	7,000	70,575
Okla.	58,136	82,169	3.87	699,420	1,186,430
Pa.	69,500	8,231	32	403,621	434,321
Tenn.	37	9	.64	—	—
Tex.	67,039	122,881	5.02	1,331,850	2,481,300
N. Tex.	(22,744)	(24,453)	(2.95)	(883,000)	(1,324,400)
W. C. Tex.	(10,056)	(12,960)	(3.53)	(90,250)	(176,410)
Other	(34,239)	(85,468)	(6.84)	(358,600)	(980,490)
Utah	17	15	2.46	—	—
Va.	13	4	.94	—	—
W. Va.	12,773	2,200	.47	49,500	89,500
Wyo.	3,551	8,867	6.84	151,750	222,800
Misc.	—	—	—	—	250
Totals	**370,489**	**485,637**	**3.59**	**3,743,450**	**7,946,676**

*Not available.

Mandatory Controls: A New Crossroad

At midweek, it appeared virtually certain the Administration was about to make a new policy move in an effort to ease the oil imports crisis.

The oil industry this week was on the verge of an important new experience: Mandatory government regulation of oil imports.

Through the years, oil industry leaders—and many government officials, too—have warned that any step toward government control would only lead to more and more controls.

But recent developments made a move to government regulation of oil imports almost inevitable. Or so it seemed.

Sharp cutbacks in allowables in producing states made producers increasingly vocal in their demands that imports, too, should be reduced sharply (PW—Mar.7'58,p11).

Meanwhile, new imports "quota" requests continued to pile up in the office of Matthew V. Carson, the imports administrator.

Other factors were involved: the general economic downturn, the failure of oil demand to increase to "make room" for more imports, and the Administration's all-out efforts to salvage something out of its reciprocal trade program.

The Cabinet oil committee has been reluctant to recommend to the President that he apply mandatory controls. But the alternatives were few.

If the Administration stuck to the present voluntary approach, and if the domestic oil situation continued to worsen, there would be repercussions.

If the committee tried a major overhaul of the voluntary plan, it would generate new controversy over what the changes should be.

The committee began giving mandatory controls immediate and strong consideration when it saw that Congress was moving in on the issue.

It was, in effect, facing a "fish or cut bait" situation.

More was involved than just the fear that Congress would apply mandatory controls if the President didn't.

The Administration was concerned over the effect such a congressional move would have on its entire reciprocal trade agreements program.

Some top Presidential advisors reached the conclusion that unless the oil problem was settled first, the Administration would lose important congressional support for its trade act extension.

A letter to the President from Sen. Lyndon Johnson may have been the clincher. It called for a mandatory 20% cut in imports, and a system for gearing successive cuts to any further reduction in domestic production.

Sharp Washington observers were of the opinion that Johnson's letter would not have been made public unless an announcement that mandatory controls would be applied was just around the corner.

In other words, they reasoned, the Senate majority leader from Texas wouldn't have publicly gone out front with his proposal unless he had prior assurances that he would get backing.

Johnson didn't fail to tie the oil imports issue to the general economic situation.

"The domestic oil industry is reeling under the impact of imports," he wrote. "Any depressed industry tends to drag down other segments of our economy with it . . . ."

The handwriting began to show on the wall during a recent House group hearing on the oil imports aspect of the trade act.

At that hearing, producer spokesmen made it clear that they wouldn't be satisfied with anything less than mandatory controls.

One importer—only one—did make an attempt to stem the tide. And jobber groups voiced their opposition to a lid on imports. But there was no evidence of any real "campaign" by opponents of imports controls. Rather, there was some feeling that many importers were about resigned to a mandatory government plan.

The Administration had not, at midweek, made up its mind on a specific plan of controls.

There was renewed speculation that an earlier proposal to tie imports to domestic refinery runs was being given consideration again.

Oil Man's Album

Here's Where the Middle East Oil Rush Began

The golden anniversary of the first discovery of oil in the Middle East is being celebrated this month in Iran. The first wildcat, shown in the picture, was spudded in 1902 at Chiah Surkh, Iran, by William Knox D'Arcy. It proved dry, but eventually led to the fabulous oil finds of the Middle East. The first strike was made at Masjid-i-Sulaiman, on the site of an ancient fire temple, six years later, on May 26, 1908.

(No. 5 in a Petroleum Week series)

What's New / IN THE INDUSTRY

Refining Value Penalty Hits Higher-Gravity Oil

Additional evidence that buyers are changing price schedules to base some crude postings on actual refining values came last week.

Such a move has been growing during recent months and is gradually leading crude postings away from the historical strict gravity scale postings (PW—Mar.7'58,p12).

Lafitte Oil Traders, Inc., a Cities Service Oil Co. subsidiary, effective Mar. 10, reduced postings for 40- to 44.9-gravity crude in five parishes in southwest Louisiana to $3.30 a bbl., 15¢ below its previous posting for 40-gravity and above.

Crudes and condensate from 45- to 55-gravity were reduced 2¢ a bbl. for each degree of gravity increase.

The move involves 4,000 b/d.

The parishes involved are Beauregard, Jefferson Davis, Calcasieu, Acadia, and Allen. Low-cold-test crudes in Acadia Parish were not affected.

The company said the gravity adjustments reflect a pattern previously adopted in other areas and are in line with modern refinery realization trends.

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Regardless of the indicated improvement in demand in recent weeks, supplies of crude and product continue long in some areas (PW—Mar.7'58,p79).

General Petroleum Corp. this week asked California producers to cut 10% from the volume they sell the company.

Previously General reduced its own crude output in California 10%, or about 6,100 b/d. It also cut imports from Canada to its Ferndale (Wash.) refinery by 26%.

On the Gulf Coast, Humble Oil & Refining Co. reduced runs at its Baytown refinery by 10,000 b/d, the third cutback it has made in the past three months.

The new cut lowers the plant's operating schedule to 185,000 b/d, nearly 100,000 b/d below capacity.

•

Signal Oil & Gas Co. and Associates have found oil in a second formation in Venezuela's Lake Maracaibo.

The company described the new producing horizon as the Eocene C-2 sand. The group's No. 4-X Centra Lago test flowed at a rate of 5,136 b/d through ¾-in. choke on test of the formation from 10,044-200 ft.

The test is the fourth drilled by Signal and its partners—Pure Oil Co., Standard Oil Co. (Ohio), and Hancock Oil Co.—on a 28,000-acre concession.

At the time of the test of the formation, all of the C-2 sand had not been drilled.

The group's earlier 2-X and 3-X tests found production in the C-5 sand at approximately 12,000 ft. The 4-X test is now being drilled to the deeper sand. The C-2 sand was encountered in the earlier holes but was not tested.

•

A gas pipeline company plans to appeal to the U.S. Supreme Court a Texas court's ruling that it is a common purchaser.

The case involves an order of the Texas Railroad Commission which declared Permian Basin Pipeline Co. to be a common purchaser and ordered it to buy ratably from all producers in the Puckett area of Pecos County.

It was the first time a gas pipeline had been declared to be a common purchaser.

Permian won a verdict in the 98th District Court at Austin. But the commission was upheld when the case was taken to the Third Court of Civil Appeals.

Last fall, the Texas Supreme Court refused to set aside the appeals court opinion (PW—Oct.18'57,p11).

•

Dresser Industries, Inc., plans to acquire The Elgen Corp., an electronic well-logging firm in Dallas, through and exchange of stock.

The proposal to exchange one Dresser common share for each 3.4 shares of Elgen common has been approved by directors of Elgen. Final stockholder approval is awaiting clearance of a Dresser registration statement by the Securities & Exchange Commission.

Paul L. Elvington, vice-president of Elgen, says the agreement calls for Elgen to continue as an operating unit of the Dresser group.

•

The formation of two new Arab governing groups apparently killed the chances of mutual agreements on Middle East pipeline transit problems.

Since the creation of the United Arab Republic, joining Egypt and Syria, and the Arab Federation, linking Iraq and Jordan, and semblance of Arab unity appears remote.

In fact, the moves have led to new bickering. President Nasser, of the United Arab Republic, has denounced the Arab Federation. And Iraq has said it would not recognize the United Arab Republic.

Both Egypt and Syria have accused Saudi Arabia's King Saud of having financed an alleged plot to assassinate Nasser.

And it now appears that a twice-postponed meeting of the Arab League's Economic Council may never be held.

•

Use of a "proper" blend of motor oil can reduce the octane requirements in new automobiles by as much as six numbers, according to three scientists of Standard Oil Co. (Ind.).

M. L. Kalinowski, L. D. La Croix, and R. E. Nejdl told a joint meeting of the Society of Automotive Engineers and the American Society of Lubricating Engineers this week that tests of six leading commercial motor oils had indicated the best base oil and chemical compounds for obtaining desired quality and best performance.

•

Jersey Standard's third entry into Midwest markets, through a proposed merger of its Oklahoma Oil Co. and Gaseteria, Inc., may not be concluded for another month or two.

Gene L. Williams, president of Gaseteria, said the proposed merger with the Chicago-based Oklahoma Oil (PW—Feb.14'58,p8) is "still in the hands of a battalion of lawyers" and may not be concluded for another 30 to 60 days.

Jersey has owned Pate Oil Co. of Milwaukee since 1956.

A Slight Delay

A story on the current oil picture in Great Britain—originally scheduled for this issue—has been delayed. However, it will appear soon.

It will be the second in a new series on how oil situations abroad compare with those in the U.S.

Looking Ahead in Washington

McGraw-Hill
Washington
Bureau
March 14, 1958

An Administration move to apply mandatory controls to oil imports changes the situation in Congress, even though domestic producers have testified they want legislative controls regardless of White House action. Too many congressmen feel such action would be giving the producers both bread and cake.

The Administration dilemma: Congress would act if the President didn't. In fact, the entire issue is a problem of practical politics. With administrative controls on imports, Eisenhower's trade bill could probably be guided through Congress by Sam Rayburn and Lyndon Johnson. With no oil controls, Rayburn and Johnson wouldn't be able to carry the day.

Sen. Johnson set the tone in a letter to the White House. In it, he urged presidential action, saying flatly that the domestic industry was reeling under the impact of imports. It was the first time this year Johnson had spoken out so sharply. And, as Senate leader, his words carried weight.

Giant buttonholing program is being readied to back free trade. Representatives of some 108 organizations favoring expanded trade policies will meet in Washington with White House backing Mar. 27 for a show of strength, then start lobbying Congress for extension of the trade act. Some oil groups may be included.

•

The Roosevelt subcommittee may get back into action soon. Rep. James Roosevelt (D., Calif.), head of the House small business subcommittee, plans a look at gasoline surpluses. Roosevelt hopes to find a counsel and get started soon after Congress' Easter recess.

•

The Federal Trade Commission's latest action on re-refined oil is significant. The commission voted unanimously to require three reclaiming companies to brand their oil as used. And the order went further: The companies must disclose in their advertising and promotion campaigns that the oil is used. The Assn. of Petroleum Re-refiners may force a legal test of FTC's order. Then, for the first time, a court could give a clear ruling in the controversy.

•

A new Pentagon buying policy is being considered. The plan is to pump more money into labor surplus areas by buying especially from small businesses.

•

The State Dept. is keeping a close eye on South American oil problems. The spots being watched are Venezuela and Argentina. U.S. diplomatic experts think more internal trouble might come in Venezuela if a general election is held soon. And U.S. oil policies—mainly the reduction of imports—could get into the act.

New oil proposals by Argentina are drawing attention. The U.S. is wary of statements by the new Argentine president-elect, Artura Frondizi, that he wants no "theoretical talks" on the possibility of opening up the country to foreign oil companies. Frondizi's view is that any interested companies should simply make their proposals to his government. There probably will be discussions here if Frondizi visits the U.S. soon.

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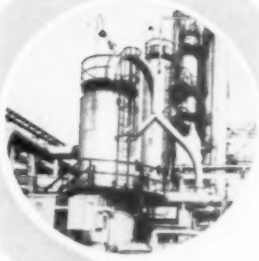

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DEPT/Exploration, Drilling, Production

API Meeting Highlights Four Corners

Drilling and production problems and practices in Four Corners area reviewed at Southwestern District meeting. Big developments in communications forecast.

The Four Corners area received heavy attention at this week's annual meeting of the Southwestern District, Division of Production, American Petroleum Institute.

Four of the eleven papers presented at the Ft. Worth meeting dealt specifically with the Four Corners area. The others dealt with a variety of production and drilling problems and developments.

The Four Corners area has a bright future, Bert F. Gray, Jr., of Northwest Production Corp. predicted, because oil can be found and produced from relatively shallow depths at reasonable costs.

Gray spoke on the geology and exploration outlook for the area, where Colorado, Utah, Arizona, and New Mexico meet at a common point.

In discussing the exploration outlook for the San Juan Basin, Gray said:

"Although the gas development of the Pictured Cliffs and Mesa Verde [formations], in the center of the basin, is on the decline, it is anticipated that the Dakota and Gallup will get intensive drilling in the future.

"The Gallup appears attractive because it is present in the shallower portion of the basin. Continued drilling in the south part of the basin should produce trends similar to [northwestern New Mexico's] Bisti field.

"The Dakota and overlying Granéros afford good sandstone reservoirs and are being exploited."

He added that the marine Paleozoic section is present over much of the basin and holds good chances for production, but at excessive depths.

In the south half of the Paradox Basin, production is from the Upper Hermosa and Paradox members of the Hermosa formation, of Pennsylvanian age.

Pure Oil Co.'s discovery at Big Flat has made operators aware of the potential that the Mississippian offers (PW—Jan.10'58,p19).

Many salt anticlines occur within the basin, Gray said, but no commercial quantities of oil have been found. "The flanks of these structures have possibilities," he added.

The Black Mesa Basin should receive "considerable attention" in the future, Gray predicted. He noted that the basin covers about 7,000 sq. mi.

"The basin has many large, undrilled anticlinal structures," Gray added. "The structures, combined with the existence of marine Paleozoic sediments, make the basin very attractive for exploration."

Marvin Parker, of Great Western Drilling Co., reported that drilling practices in the Four Corners are being improved with better drilling fluids, better methods of controlling water flows, and higher rotary speeds in softer formations, among others.

Parker said drilling also has been improved by adding more bit weight in harder formations.

He added that the use of gas in the San Juan Basin has proved to be the most economical method of drilling when formation water is not encountered. But drill-string maintenance is more critical in gas drilling, because tool-joint wear is increased.

The maintenance of surface equipment is much the same as in other areas, except for the effect of very hard water, containing fine solids in suspension, Parker reported.

The availability of water is a common problem throughout the area, Parker said. The operator usually pays for the water, but the contractor is responsible for laying lines, installing water pumps, and pumping the water. The below-freezing temperatures in winter, however, make pumping almost impossible. And the cost of hauling water has added up to as much as $2.50 per ft. of hole drilled in a few cases, Parker reported.

Transportation is another major problem. Rugged terrain, state regulations, inadequate trucks, and, most important, bad weather, force transport costs up.

These same factors also have helped to cause an above-normal personnel turnover, high accident ratios, increased maintenance costs, and greater frequency of fishing jobs.

An El Paso Natural Gas Co. engineer reported that gas-well production within the San Juan Basin can be maintained through use of intermitters and plunger-lift equipment used in various ways to fit individual well needs.

A. J. Dudenhoeffer reported that gas production from the 1,416 Mesa Verde and 2,023 Pictured Cliffs producers in the basin is hampered by (1) liquid production; (2) accumulation of paraffin in the tubing; and (3) bridging between the upper and lower producing zones.

The most common method of producing Pictured Cliffs wells is to complete with 1¼-in. tubing string, Dudenhoeffer said. Liquids that accumulate in the wellbore are unloaded to the atmosphere—a process commonly called purging the well.

In each instance, gas used to bring this liquid to the surface is wasted. The optimum frequency of purging thus becomes a compromise between (1) the gas production loss resulting from the liquid accumulation, and (2) the quantity of gas wasted in getting rid of the liquids.

When purging frequency becomes stabilized, installation of automatic time-cycle controllers, or intermitters, to perform the operation leads to increased production, he said.

He reported that Mesa Verde wells that produce more than 500,000 cu. ft. of gas daily, and have trouble with liquids, can be helped by use of a plunger-lift to produce gas and liquid through the tubing. This method does not waste gas by blowing to the atmosphere to remove liquids.

Dudenhoeffer said the method permits steady production of gas, without waste due to purging. The plunger also acts as a scraper to keep tubing free of paraffin and other deposits.

On wells producing less than 500,000 cu. ft. daily, plunger-lift installation can help, provided the wells are cased through the pay zone. The method requires that gas used to lift the liquids be blown to the atmosphere, but the efficiency of lift is much greater than with intermitter applications, he said.

Oil field communications have progressed "from Model T to microwave" in 30 years. The next transition will be to completely remote-controlled oil fields and other similarly striking developments, Shell Oil Co.'s E. W. Jenkins, Jr., predicted.

Jenkins defined good communications as the most effective means of transmitting intelligence from one point to another.

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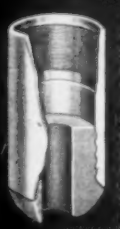

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dial telephone, two-way radio, high-speed teletype, facsimile, and television has made possible the rapid transmission of information from one point to another, Jenkins said.

Jenkins added that there is still no inexpensive, reliable method of transmitting high-frequency radio and microwave signals over long distances without using intermediate repeater stations.

There also is no automatic method of verifying teletype messages, nor is there a satisfactory way of preventing interference between radio systems operating on the same frequency in the same locale, he continued.

Tomorrow's communications are already in the experimental and developmental stages, Jenkins reported. Some of these communication methods and equipment will have direct application in the oil fields.

At least two methods of transmitting radio and microwave signals over long distances without intermediate repeater stations are presently being developed, Jenkins said.

The first method, known as forward scatter, or trans-horizon, communications, involves the use of large amounts of radio frequency power (from 50 watts to 40 kilowatts), together with huge, high-gain directional antenna systems. The signals are actually scattered past the horizon by reflections from abnormalities in the troposphere or the ionsphere.

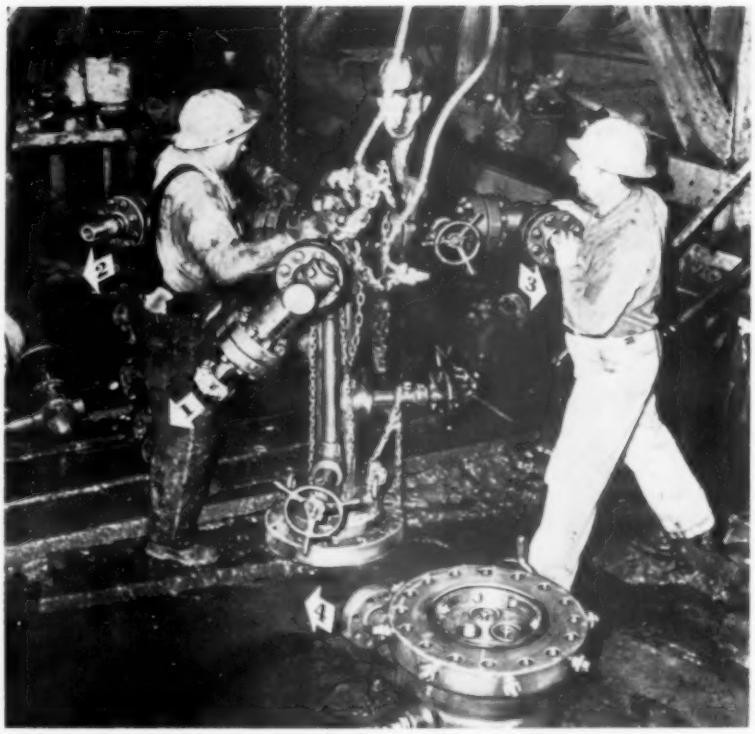
The second long-distance communication method is known as "meteor-burst communication." This method depends on ionized meteor trails to achieve a signal-scattering effect. It has one disadvantage: messages must be prerecorded.

The future may see complete remote control of oil fields, Jenkins said.

Admittedly "star-gazing," Jenkins predicted that communication links, together with special associated telemetering, computer, and remote-control equipment, could very well be used by refineries to control lease production. The refineries could use computers to establish production levels and make lease production conform with these calculated levels, thus greatly reducing surface storage requirements.

Leases equipped with automatic metering devices could telemeter shipped crude volumes—corrected as to temperature, gravity, and bs&w—to paying-office computers, where royalty and production payments could be calculated and checks written automatically.

Jenkins said these developments may take nearly as long to come about as present methods did.



FOUR GAS OUTLETS (arrows) put quadruple completion in the limelight as . . .

Multi-Completions Grow

The growing trend toward simultaneous production of several zones in a well is underscored by what is said to be the world's first quadruple completion.

Multiple completions — excluding duals—were still in the planning stages only a few years ago. Now they are coming more and more widely into use as a cost-saving method of getting more oil out of the ground.

In Louisiana, for example, there are now five gas triple completions and twelve oil triples. Permits are pending on two other triples in the state.

In the opinion of some oil men, quadruple completions will be the last in the series. Beyond that—quintuple completions, for example—production problems would be too great, they say. Also, too many factors—depth, number of pays, and others—limit the use of multiple completions in many-zoned fields.

The quadruple completion is Magnolia Petroleum Co.'s all-gas well in Southwest Texas.

Magnolia No. 1 Santa Cruz Farms, in the San Carlos field, Hidalgo County, produces from four zones of the Frio sand. The field is on an anticline.

None of the gas zones are new discoveries: each has been located previously by other wells in the field. Also, it is not the first multiple completion in the field. Coastal States Gas Producing Co. has had two triples in the last year, both of which produce from formations tapped by Magnolia's quadruple.

Whether or not the Texas Railroad Commission will permit Magnolia to produce its well as a quadruple completion is problematical.

The company has asked for approval, but a hearing date has not yet been set.

It may be that, since all four zones produce gas, the commission will approve the completion. The commission has in the past approved some 12 to 15 triple completions, mostly where three gas zones are involved.

No triple completions have been permitted where two oil zones are involved, although dual wells have been allowed for some time. The commission feels that a policing problem would arise where there are two oil zones and one gas zone.

Magnolia's well was completed from Frio sands at:

- **7,629-49 ft.** Flow was rated at 3,098,000 cu. ft. of gas per day

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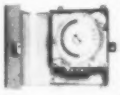

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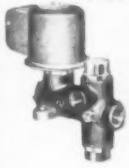

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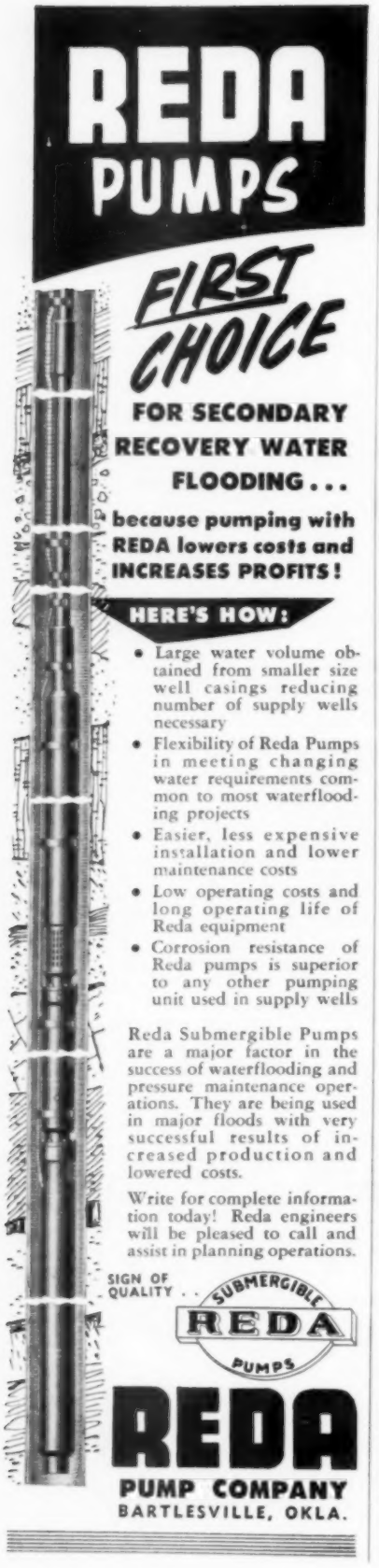
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through ¼-in. choke and perforations in the FF-18 zone.

• **7,533-60 ft.** This interval flowed 3,066,000 cu. ft. of gas per day through ¼-in. choke and perforations in the FF-2 zone.

• **7,455-95 ft.** This interval flowed 3,759,000 cu. ft. of gas per day through ¼-in. choke and perforations in the FE-81 zone.

• **7,024-30 ft.** This interval flowed 3,066,000 cu. ft. of gas per day through ¼-in. choke and perforations in the FD-93 zone.

No estimates were made on condensate output. The company is still in the process of running its open flow potential for each zone.

In the quadruple completion, three zones flow through separate parallel strings of tubing, and the fourth flows through the casing annulus.

In Magnolia's well, 7⅝-in. O.D. casing was used. Inside the casing are three strings of 2 1/16-in. tubing.

A wellhead developed by Oil Center Tool Co. is being used. When three strings of tubing are run, all three hangers are grooved for OCT-Otis back-pressure valves. Blowout preventers are not removed until all strings of tubing are in place in the well, to insure complete control throughout the completion operation.

Magnolia used a Baker model D-1 triple string flow tube, which keeps the perforations segregated. Baker says that the flow tube was used for the first time on the quadruple completion.

A Garrett Oil Tool circulating sleeve was used on the two upper strings of tubing. This was done so that if the well has to be killed, mud can be circulated without unseating the packer.

Between the two bottom zones, a Baker model D packer was set at 7,615 ft. Between the FF-2 and FE-81 zones, a model F packer was set at 7,505 ft. The top packer is a model FA, set at 7,437 ft.

A rubber joint made by Guiberson, Inc., covers each string of tubing opposite the upper perforation. This protects the tubing against erosion from gas pressure in the upper perforation.

Magnolia anticipates no problems in operating its quadruple completed well. The company hasn't encountered any problems in the past from sand in the field, and it has no corrosion problems. A company spokesman says "We probably wouldn't have made this a quadruple completion if our past experience had indicated sanding."

For either quadruple or triple completions, the big saving is economic, says Royal W. Reiss, Aluminum Co. of America. Reiss addressed a recent meeting of the southern district, division of production, American Petroleum Institute. According to Reiss:

• **Development and operational costs are reduced.** Initial investment, he said, is increased by the cost of additional packers and tubing strings and a special Christmas tree. But this is more than offset, he went on, by reduced operating costs and increased initial productive capacity. In many old fields, he said, present production methods and future possibilities are being reviewed in the light of multiple completions.

• **Reserves are increased,** because multiple completions make many thin zones commercial.

Where multiple completions are made, Reiss said, the zones are tested, and remedial work is performed, during the initial completion. Thus it becomes feasible to test and complete thin sand sections, because this initial expense can be written off at the beginning. In a multiple completion, three or four zones can be produced as cheaply as one.

• **Less steel is required.** It is obvious, said Reiss, that if one string of casing does the work of three, the result is a substantial saving of steel. In the case of old fields, wells have been recompleted as duals or triples, thereby increasing the number of wells with tubing the only additional steel requirement.

Among the newest triple completions is a CATC offshore well. The completion is waiting for Louisiana Mineral Board approval.

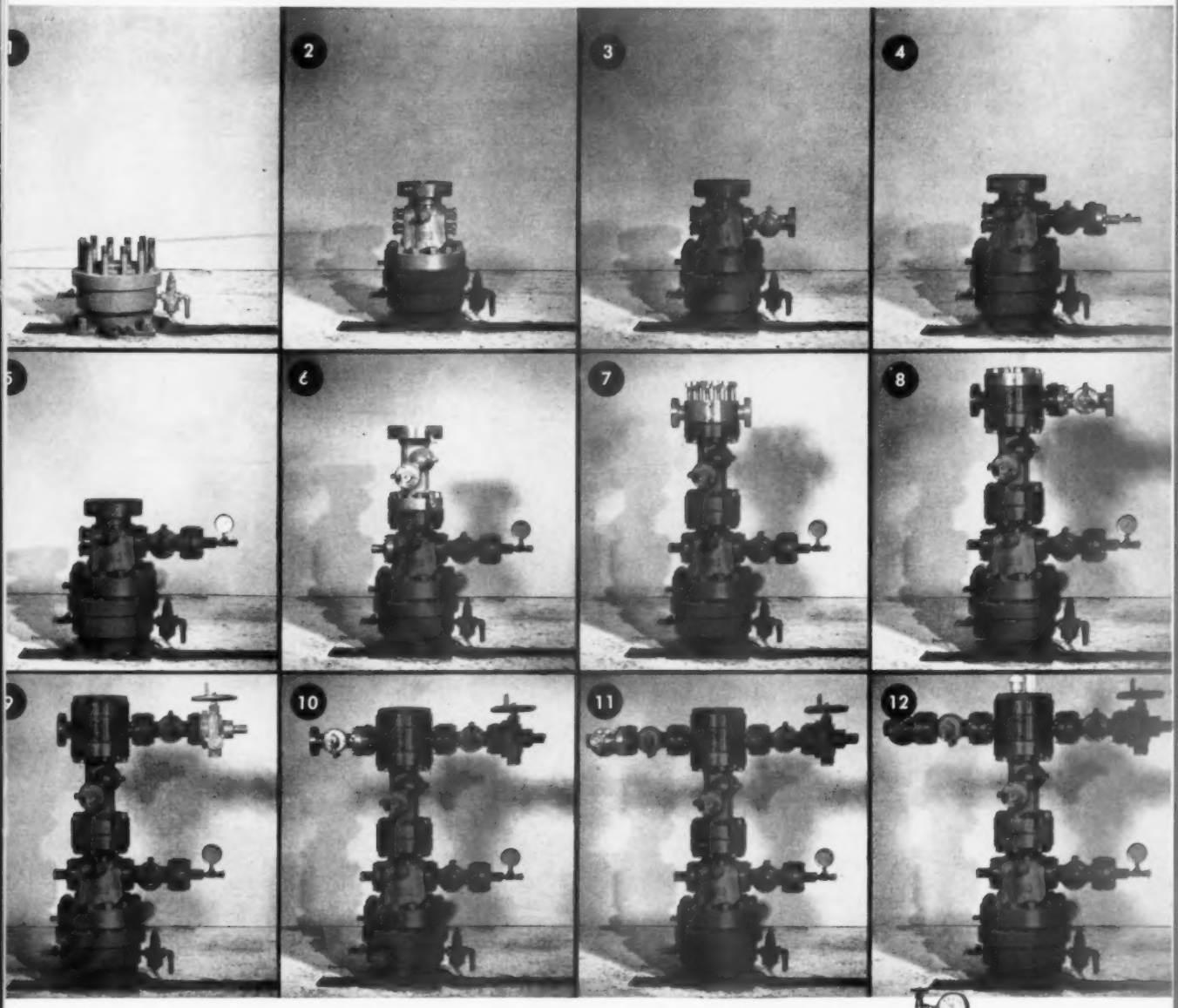
The No. 1 Grande Isle area, Block 70, is about 23 mi. off the coast in 137 ft. of water—the deepest water depth yet drilled in the Gulf.

Total depth of the well is 13,495 ft. It flowed 253 b/d of 32-gravity oil through 8/64-in. choke and perforations at 8,356-72 ft. From perforations at 8,414-22 ft. it flowed 190 b/d of 28-gravity oil through 8/64-in. choke. At the deepest interval, it flowed 75% oil through 12/64-in. choke and perforation at 9,240-54 ft. No gauge of the oil flow from this zone was taken.

The CATC group (Continental, Atlantic, Tidewater, and Cities Service) has a block of 28,000 acres in the area. Nearest production is in Block 43, 2½ mi. north of the discovery.

Another Louisiana triple completion is Arkansas Louisiana Gas Co.'s project, the first in the northern part of the state to produce simultaneously from three zones.

Existing triple completions in the



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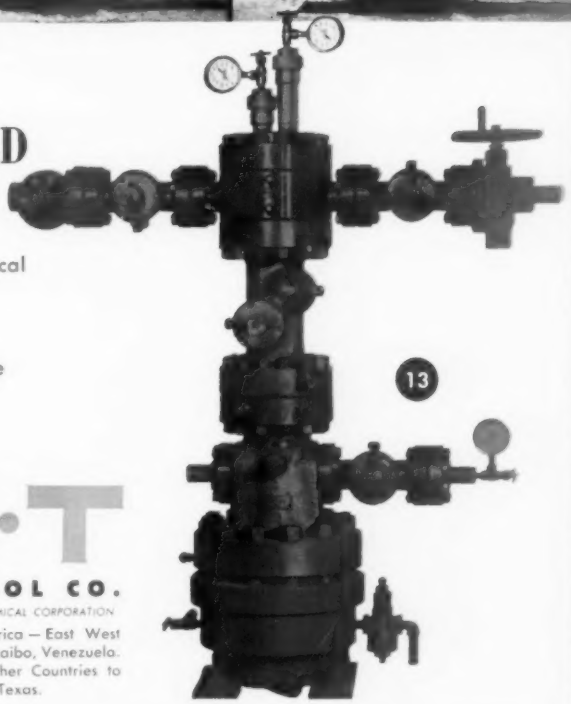

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northern part of the state have tubing shift valves for production from only two zones at a time, with the ability to shift from one zone to another.

ALG's triple—No. 2 Fowler Unit—is in section 10-7n-4w, on the southwest side of the Simsboro field, Lincoln Parish.

The company plans to produce two zones through 2-in. tubing, with packers on each, and the other zone through the annulus. Three meters have been set at the wellhead to measure production from each of the three sands.

The well has tested good production of gas-distillate from three reservoirs in the Hosston sand series between 7,220-903 ft.

A string of tubing has been set to the lowest reservoir to tap production from the lower "L" zone, at 7,811-903 ft. Estimated open flow from the zone is 4.1-million cu ft. of gas per day, and 2 b/d of distillate.

Another string of tubing was run to the upper "L" zone at 7,674-731 ft. The flow was 6.7-million cu. ft. of gas per day and 3 b/d of distillate.

Production through the annulus is from the "K" zone at 7,220-58 ft. The flow is estimated at 5.4-million cu. ft. of gas per day and 2 b/d of distillate.

ALG owns a 63% interest in the well and its 640-acre unit.

New: Color Aerial Photos

At least one major oil company is considering this week the possibility of an extensive surface exploratory program utilizing one of the potentially most valuable techniques to evolve in the past few years—aerial color photography.

Black-and-white aerial photography has been a recognized and useful exploratory tool for many years.

Interpretation experts can spot surface indications of likely structural targets from such aerial photos, or they can use such indications to help decide drilling locations.

Color aerials are now adding a new dimension, a development which can almost be considered revolutionary.

In use for some time, the process now is attracting the attention of companies planning exploratory programs involving huge land areas.

Baker Surveys Corp., of San Antonio, has pushed the development to a point where it can be a time-saving shortcut to the pinpointing of promising structures.

W. W. Baker, owner of the firm, got into the aerial photography business more by accident than by design. An engineer, he started with a surveying firm, adding aerial photography as a service as he went along.

Eventually, he began to think of color as a better method of delineating differences in surface features.

Despite predictions of failure—no method of high-level color photography had ever been consistently successful—Baker plunged into an expensive experimental program.

Today he is able to shoot and put together a complete color mosaic within hours.

The key to the value of color aerials lies in the subtle shadings of the colors.

The structural features do not appear in any given color. In one area, the structure may appear as a reddish brown; in another, as a light green; in still another, as a different shade of blue; and so on.

But the point is that the structures do show up as a different shade, or hue, from that of the surrounding terrain.

The variance in shading results from vegetation, soil changes, features of terrain, and the like.

Structures, fault lines, unconformities, and such, stand out on a color

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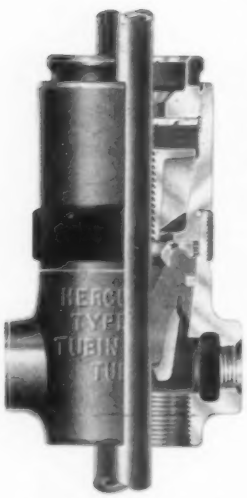
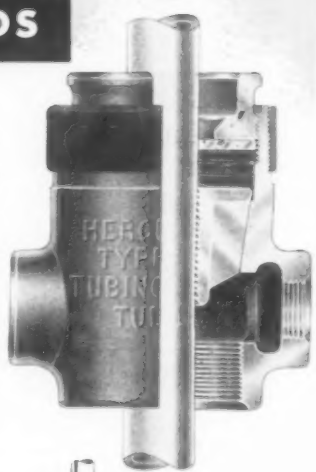


"TYPE J-5" TUBING HEAD

Ideal for flowing or pumping wells or for well servicing and repressuring projects. Will suspend 2" tubing to 5½" casing up to maximum of 180,000 pounds. Head is full-opening; constructed of pressure cast steel tested to over 4,000 psi. HERCULES original overhead packing arrangement and hinged slips facilitate installation and servicing. HERCULES Neoprene Tubing Stripper (2" - 2½" - 3") may be used in this head on wells flowing intermittently or to wipe tubing. Equipped with safety threads.

"TYPE J-5-S" STRIPPER TUBING HEAD

The dual purpose "Type J-5-S" Stripper Tubing Head is basically a "Type J-5" Tubing Head with a bowl (top section) screwed into the packing nut thread. The hinged slips, packing and packing nut are installed in the bowl (top section) with the tubing stripper in the body (lower section), thus permitting tubing to be run-in or removed under pressure. Test pressure is the same as the "Type J-5" Tubing Head.



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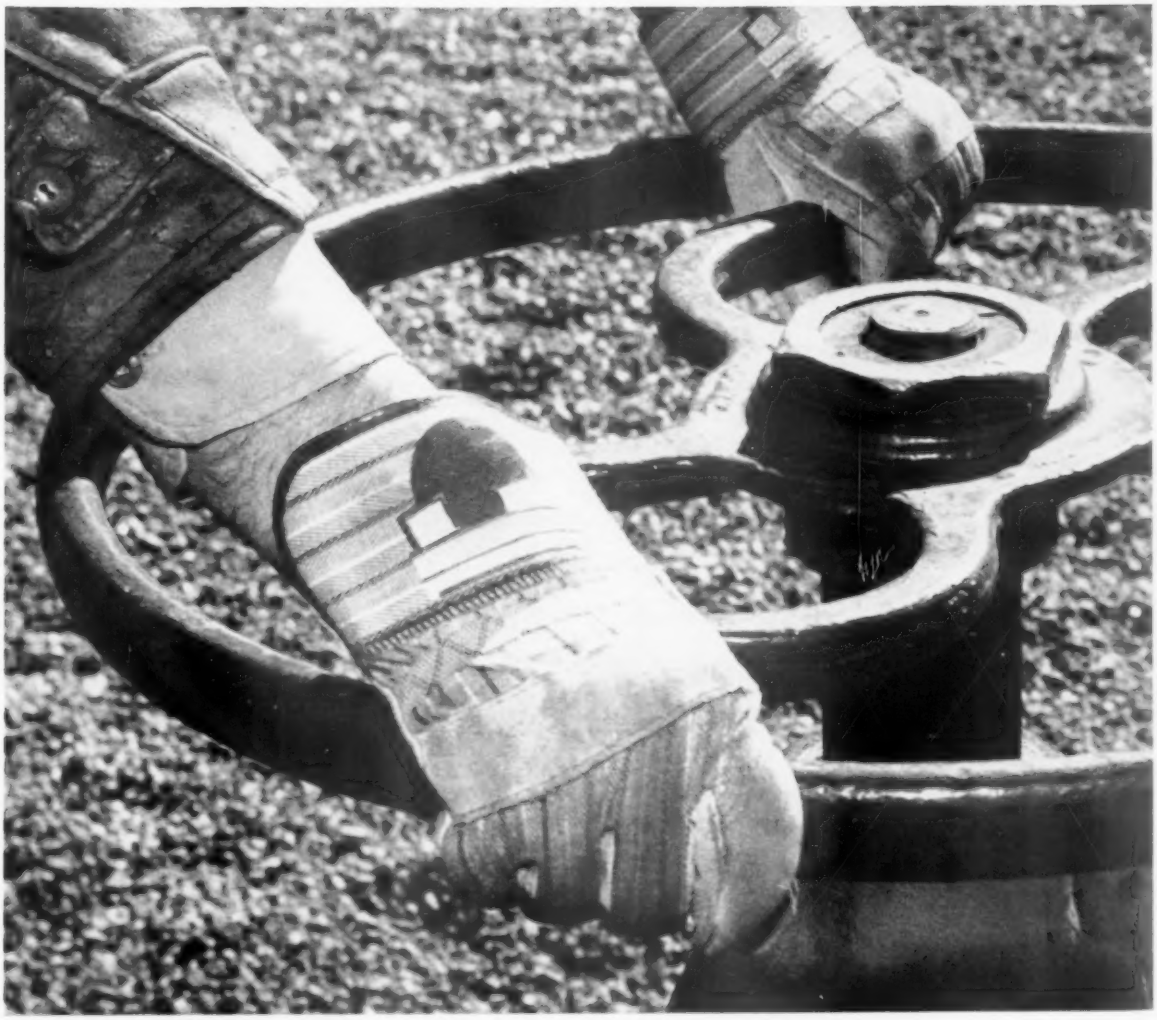

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mosaic to the practiced interpreter as boldly as sign posts.

Not infrequently, a structure that appears on the ground, and even on black-and-white aerials, as a single feature, will show up as two or more separate features on a color aerial.

Baker has perfected several trade secrets in developing a successful technique.

The use of special camera filters to cut haze and overcome other problems, and still produce a readable color aerial, is one of the contributions.

Another is the use of special printing materials and methods so that the mosaics are put together dry, without the need of using a wet procedure and stretching.

Still another is a developing process so involved that a special electronic device keeps the temperature of the chemicals within a fraction of a degree for hours.

The cost of the color aerials is not prohibitive.

Baker quotes a price of $20 per square mile for the service.

Baker now shoots his aerials from an altitude of 17,000 or 18,000 ft., printing a mosaic to a scale of 2,000 ft. to 1 in. The mosaics can be tied in to field maps.

Plans now call for shooting at an altitude of 25,000 ft., which will increase substantially the area covered by one photograph. The aerials can be blown up to permit close study.

Reaction to the new exploratory tool has been enthusiastic.

So far, the majority of Baker's clients have been independent operators, although the firm has done some work for majors.

One geologist, pointing to a portion of a color aerial, said: "It's a remarkable thing. Here's a big structure. I knew about it before, but look how the color shows a bend and a kind of split in it that wasn't apparent. And, over here, you can trace a fault line almost as easily as if it were drawn in for you."

Just recently, one company reportedly moved a location several hundred yards as a result of taking a look at a color aerial, which corrected its previous idea of where a fault line ran.

The technique, of course, isn't seen by operators as a substitute for surface exploration.

But used in conjunction with other surface geology, subsurface geology, geophysical information, and the like, it may reduce dry-hole risks considerably.

Color aerial photography is barely getting started now, and is sure to get a good workout in the next few years.

No Cause For Alarm, Says Banker

There's nothing wrong with the oil producing industry that couldn't be cured by a sustained 2% increase in demand, according to Charles R. Dodson, of the First National City Bank of New York.

Dodson made this point at last week's fourth annual joint meeting, in Denver, of the Rocky Mountain Petroleum Sections of the American Institute of Mining, Metallurgical & Petroleum Engineers.

Dodson said that the producing industry "need not be distressed" by the present price fluctuations. "Similar price adjustments have occurred before without lasting bad effects," he noted.

The New York banker said that one new aspect in the present-day picture is the impact of oil imports—"which impact is having an adverse effect on the domestic producers' market for oil."

But, Dodson continued, the present "bearish trend" in the industry could disappear with a sustained 2% increase in demand. "This being true," he said, "it behooves all petroleum people to do their part to expand and stimulate oil demand and keep supply in step."

Most of Dodson's talk, however, dealt with the economic factors bankers consider in making loans on oil and gas production.

The New Yorker said that such loans depend on a thorough analysis and correct evaluation of numerous credit considerations.

These can be segregated, he said, into five general categories: (1) management; (2) engineering; (3) legal; (4) government regulations; and (5) economics.

All groups are equally important to banks, Dodson said, but economic considerations appear to have received too little publicity.

In considering oil loan economics, Dodson said, posted crude oil prices are studied first. This is a complex problem, and is closely related to general business conditions.

Although costs and taxes on oil production may be currently from 15% to 20% of the posted price, and appear to provide a wide margin of profit, Dodson said, a different stiuation exists when 60% to 80% of a price is pledged, or needed, to service debt.

"Consequently," he added, "a relatively minor increase in costs or taxes could jeopardize the operation, and possibly cause a reduction in debt service.

"If the latter occurs, additional time and reserves will be needed to extinguish the obligation."

Dodson said that prices historically have been cyclical, and the fluctuations have closely followed general business conditions.

Cycles in oil production also are related to general business cycles, Dodson told the AIME meeting.

He noted that the downturns in gross national products in 1923, 1929, 1937, 1944, 1948, and 1953 were all accompanied by drops in oil production.

"Actually," Dodson said, "oil production has been relatively more variable than GNP, except from 1935 to 1956."

Dodson said that price and production are not the only factors of importance to be watched. State proration and buyer proration are also vital in loan decisions.

For these reasons, he concluded that (1) banks are justified in requiring substantial safety factory in oil loans, and (2) the usual "two-for-one" margin is reasonable in most cases.

On another front of interest to oil men—logging equipment—a new petrophysical tool, sonic logging, is expected to lead to better evaluation of reservoirs and to other benefits.

C. A. Doh and R. P. Alger, of Schlumberger Well Surveying Corp., reported that the new sonic logging device is based on a development by Humble Oil & Refining Co. (PW—Special Report/Exploration — Mar.7 '58,p47).

The device features a two-receiver system and a short spacing, generally 1 ft. A third receiver, at an interval of 3 ft., provides an alternate spacing, which can be used when suitable to local geological conditions.

Doh and Alger said that correlation problems, which sometimes are difficult with conventional electrical and radioactive logs, may be improved with sonic logs.

They added, however, that the main advantage of sonic logs over other logging devices appears to be the accurate detection and measurement of porosity.

"It is safe to say that, since we are only at the threshhold of sonic logging, its value in applications already established will increase, and new uses will be found," they predicted.

Doh and Alger said that many engineers who have worked with the sonic tool "believe that it is the best porosity tool presently available for consolidated formations."

Multiple bands of tungsten carbide are continuously overlapped on this Spang tool joint as it rotates at a constant, predetermined speed.

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Spang Hardfacing affords the best protection ever developed for tool joints in abrasive formations.

The method of application is the tungsten inert gas welding process. Multiple bands of tungsten carbide are continuously overlapped on the scale-free surface to form a solid band. In the tungsten inert gas welding process, the tungsten carbide particles are automatically "plowed into" the joint surface in exact, metered quantities. No grooves are required for this application, and everything is automatically controlled to eliminate human error. Each joint is pre-heated to further insure a perfect bond between the parent metal and hardfacing material. Each tool joint is stress relieved after hardfacing to make sure the physical properties of the parent metal are not impaired.

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Spang Hardfacing is a typical result of National's product research and development program. Like all Spang processes and products available at National Supply, quality control insures its superiority.

Why operators buy
Spang Drill Pipe and Tool Joints

When the drilling schedule is difficult, it pays to have a quality drill string. Operators buy Spang Drill Pipe because they know that its performance has been proven in countless wells.

Look at these features of the two types of Spang Tool Joints.

Spangweld—Tool joints are welded to the drill pipe by an automatically controlled operation assuring accurate alignment and a high quality weld. Welding permits a streamlined contour and a reduced initial cost due to elimination of numerous machining operations.

Spang Double Seal Shrink Thread—Tool joints can be removed and replaced in the field, saving the cost of returning the string to a field shop. Joint design has an outer seal, threads, and inner seal all on a single cone. This insures uniform, reliable installations both at the mill and in the field, and completely seals against internal and external pressures.

As well depths and costs increase, these are desirable drill pipe features to rely on. Moreover, you can get the extra protection of Spang Banded Hardfacing (either "Banded Medium Density" or "Banded High Density") for abrasive service conditions, and Spang Plastic Coating for corrosive conditions (see below).

Specify Spang Drill Pipe for your tough jobs, and you'll get a good start toward lower operating costs!

If you need maximum protection against corrosion, specify Spang Plastic Coating. Scientifically applied at the mill with specially-developed facilities, it is the best you can buy. Available in Spang Drill Pipe, Tubing and Line Pipe (shown here).

◀ Spangweld and Spang Double Seal Shrink Thread Drill Pipe are available in a full range of sizes, including diameters for slim hole operations.

Protect a good drill string with National Collars—next page . . .

What's New /

To insure true straightness, the entire length of a National Drill Collar is carefully gauged. Core samples from the trepanning operation are examined and measured for bore concentricity.

Why National Drill Collars give extended service

Proper joint design and rigorous manufacturing standards are the reasons why you obtain outstanding drill string protection when you specify National Drill Collars. Made from alloy steel, these precision collars are hardened and tempered full length for high strength. True center bores are machined on a special lathe designed for this purpose. In the threading operation, a stress relief groove is made in both box and pin to provide maximum fatigue resistance.

The results are drill collars that promote maximum penetration rates at all drilling speeds, and extend the service life of your drill string. See a National Supply representative soon about the drill collar sizes to meet your needs.

National Drill Collars are simultaneously bored from both ends on a 165-ft. trepanning lathe especially designed for this purpose.

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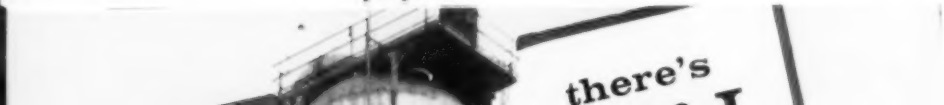


What's New / IN EXPLORATION, DRILLING, PRODUCTION

Seek Expansion of Gas Markets For West Canada

Immediate action to expand markets for western Canada's natural gas has been urged by a group of nine independent oil and gas companies in a joint submission to the Borden Commission.

The group stressed the contribution made by independent companies in developing Canada's oil and gas resources, and the effect of restricted markets on their operations. In support of their stand they cited large additions to reserves that will be proved by additional drilling. Combining of provincial and export markets was said to be a means of protecting Alberta consumers from diminishing gas supplies and rising prices.

The brief was presented by Amurex Oil Co., Bailey Selburn Oil & Gas, Ltd., Banff Oil, Ltd., Canadian Export Gas, Ltd., Canadian Husky Oil, Ltd., Canadian Superior Oil Co. of California, Dome Exploration (Western), Ltd., Great Plains Development Co. of Canada, and Medallion Petroleums, Ltd.

•

Lease News

The Louisiana Mineral Board will offer 19,605 acres of state-owned lands for lease at its regular lease sale Mar. 20.

Seven tracts in North Louisiana, totaling 755 acres, will be among the 28 tracts to be offered.

The next lease sale will be held May 15-16. Of the total 19,664 acres up for lease in May, some 18,380 acres are located in offshore areas, mostly in Plaquemines Parish.

Under the board's new policy, lease sales are held bimonthly, instead of monthly.

Little interest was shown in the Texas School Land Board lease sale Mar. 4. of 252,866 acres offered, only 100,028 attracted bids.

Bonuses also were low, averaging $45.37 per acre.

The high bid was $301,650 by Humble Oil & Refining Co. for 150 acres in Coke County, West Central Texas, 1 mi. from production.

The Wind River Indian Agency has announced that bids will be advertised in about four months for leasing tribal and allotted lands on the Shoshone-Arapahoe reservation, Fremont County, Wyo.

It is the agency's new policy to give preliminary notices of impending lease bids to allow interested companies an opportunity to secure prospecting permits.

•

A one-man portable magnetometer has been introduced by Varian Associates, Palo Alto, Calif.

The M-49 is said to be as easy to operate as a radio, and accurate under rugged conditions.

Although reduced to about 16 lb. from the original 250-lb. station magnetometer, the M-49 contains the same essential elements.

The magnetometer is entirely battery-operated, permitting operation in remote areas, and eliminating the problems associated with differing world-wide voltages and frequencies. The batteries can be recharged by connecting them to an automobile battery overnight.

•

Under a new marketing arrangement, drilling equipment manufactured by Unit Rig & Equipment Co. will now be sold by Mid-Continent Supply Co., and carry the Mid-Continent name.

The purpose of the arrangement is to provide purchasers with the service facilities of Mid-Continent in the U.S., Canada, and South America.

•

The Texas Mid-Continent Oil & Gas Assn. has appealed to Texas producers to provide the state Board of Water Engineers with well log data to aid in protecting underground fresh water supplies.

In a letter to operators, Charles W. Alcorn, association president, urged that electric logs of each well drilled in the future, with location and thickness of all fresh-water sands and salt-water zones indicated, be furnished to the board.

Alcorn added that the board is interested in the log "only insofar as it pertains to the protection of subsurface fresh water." He urged producers to have logging service companies give their best interpretation of fresh- and salt-water strata.

The largest single offshore lease has been partially validated by the U.S. Bureau of Mines.

The bureau recognized The Texas Co.'s state lease 340—totaling more than 9½-million acres—out to the 3-league line, which is the Zone 2 area.

CATC has more acreage offshore, but the tracts are scattered.

•

Another major pressure maintenance program is expected to be launched in Alberta's Pembina field.

Texaco Exploration Co. has asked the Alberta Oil & Gas Conservation Board for permission to launch a high-pressure waterflood program on 7,200 acres in the Cynthia portion of the field. There would be 45 injection wells, on a five-spot pattern, 45 producing wells, and 45 shallow service wells. Cost is estimated at $3-million.

Officials say a three-fold increase in recovery is expected. Primary recovery now averages about 10%.

•

What is believed to be the first use of waterflooding in eastern Kentucky has proved successful, according to a new Bureau of Mines report.

A free copy of the report, R. I. 5387, "Secondary Recovery Operations on the L. C. Bailey Lease, Oil Springs Pool, Magoffin County, Ky.," can be obtained from the bureau's publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

•

A gas allowable increase for March has been granted to producers in the Woodlawn field, Harrison County, East Texas, by the Texas Railroad Commission.

The increase followed an emergency hearing Feb. 25, at which spokesmen for Mississippi River Fuel Co. testified that more production would be needed to allow the company to supply minimum gas requirements to the St. Louis area.

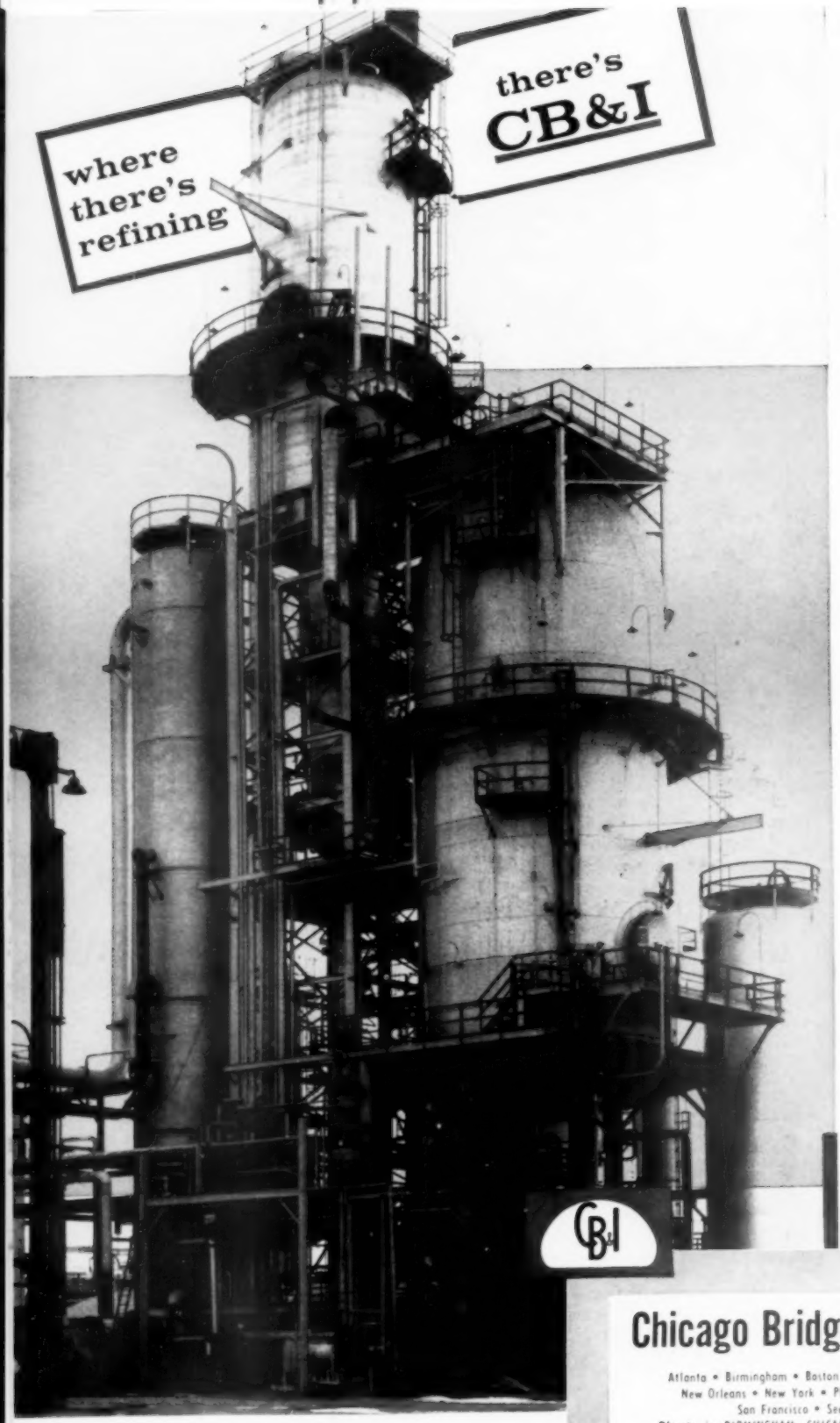
The new order will permit production of 151,731,000 cu. ft. of gas per producing day from the field.

•

Buck Creek Oil Co., Denver, has proposed unitization of a block of more than 9,000 acres in Niobrara County, Wyo.

Drilling Highlights

J. W. Gilchrist, Thomas Quevado survey, Cherokee County, was com-



Above: UOP fluid catalytic cracking unit recently fabricated and erected by CB&I at the Detroit refinery of Aurora Gasoline Company.

ANOTHER UOP FLUID "CRACKER" FOR AURORA

This new UOP-type fluid catalytic cracking unit was fabricated in our Chicago plant and erected by CB&I at Aurora Gasoline Company's Detroit, Michigan refinery.

Its predecessor, recently dismantled at Detroit and re-erected by CB&I at Aurora's refinery in Muskegon, Michigan, was the *first* UOP Univesseltype fluid cat cracker.

Aurora Gasoline Company is an independent firm which has expanded constantly and with notable progress since their formation in 1932. In that time they have repeatedly taken advantage of the facilities for design, fabrication and erection of petroleum processing and storage structures offered by CB&I.

Whether *you're* building new or expanding, see CB&I *early* in your refinery planning. Write our nearest office for further information.

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more than 9,000 acres in Niobrara County, Wyo.

A 6,500-ft. Pennsylvanian test is planned if the unit is approved by the U.S. Geological Survey.

•

Pioneer Natural Gas Co., Amarillo, has taken over the assets of Empire Southern Gas Co., Fort Worth.

Under the purchase, approved by Empire stockholders, Pioneer will distribute 187,818 shares of its stock to Empire stockholders.

•

The Washington State Gas & Oil Conservation Committee has approved a plan for orderly exploration of 103,000 acres in the Rattlesnake Hills area, in the south central part of the state.

Standard Oil Co. of California, Richfield Oil Corp., Shell Oil Co., Ohio Oil Co., and Humble Oil & Refining Co. joined with leaseholders in signing the agreement, which provides that each party will have an interest in any future tests drilled in the area.

Stancal recently resumed drilling a projected 8,000-ft. test in the area.

Drilling Highlights

New Mexico—Shell Oil Co. No. 1 James Ranch Unit, section 36-22s-30e, Eddy County, the deepest test ever drilled in New Mexico, was completed as an Atoka sand gas-condensate discovery flowing 9-million cu. ft. of gas daily and 56-gravity condensate at the ratio of 86,012:1 through perforations at 13,742-900 ft. The wildcat was drilled to 17,555 ft. and plugged back.

West Texas—Donald M. Oliver No. 1 K. M. Regan, section 26, block 58, township 2 south, T&PRR survey, Culberson County shallow upper Permian zone discovery, flowed 292.5 b/d of 29.6-gravity oil through 14-in. choke and open hole at 1,024-28 ft. The well is 6 mi. south of Geraldine Ford Delaware sand pool.

Oklahoma—Harbour, Barnes, Dawson, and Caulkins Oil No. 1 Price, section 30-2s-5w, Stephens County, flowed 300 bbl. of 32-gravity oil in 26 hours through 27/64-in. choke and 2 ft. of open hole at 2,935-37 ft. in the Arbuckle Detrital (lower Ordovician). The oil discovery is in the one-well North Loco gas field.

East Texas—Johnson & Gist No. 1 J. W. Gilchrist, Thomas Quevado survey, Cherokee County, was completed as a Woodbine gas-condensate discovery, flowing 77-million cu. ft. of gas daily plus 6 bbl. of 69-gravity condensate per million cu. ft. through perforations at 4,483-87 ft.

California—After 20 years as a one-well pool, Canfield Ranch, Kern County, finally has its second producer, but from a new pay. E. A. Bender No. 47X-27 KCL, section 27-30s-26e, flowed 350 b/d of 37.1-gravity oil through 12/64 in. choke and perforations at 8,388-402 ft. in the Stevens sand.

Louisiana Offshore—Zapata Offshore Co., Inc., No. 1 OCS-0172, block 86, Vermillion area, was completed for 3.6-million cu. ft. of gas daily and 113 b/d of distillate through 12/64-in. choke and perforations at 10,828-34 ft.

North Dakota—Amerada Petroleum Corp. No. 1 Olson, section 9-150n-95w, McKenzie County Madison (Mississippian) discovery 2 mi. southeast of Blue Buttes field, flowed 274 b/d of oil and 25 b/d of water through perforations at 9,414-54 ft. Amerada is already drilling below 6,200 ft. on an east offset.

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Where Next for Natural Gas Liquids?

A veteran 'natural' man takes crystal ball in hand and predicts the future facing gas-liquids producers.

The future of natural gas liquids will see a growing trend toward petrochemical markets, better and different processing schemes, and an increase in jointly-owned recovery plants, according to C. V. Edwards, Jr., of Magnolia Petroleum Co.

Speaking at the Permian Basin regional meeting of the Natural Gasoline Assn. of America held recently at Odessa, Tex., Edwards said he feels confident of a bright future for distillates and natural gasoline. He foresees changes in marketing patterns and processing methods, to fulfill increasing needs for chemicals and synthetics.

LPG, already well-established as a petrochemical raw material, will find increasing petrochemical and alkylate-octane outlets.

The impact of the petrochemicals industry on the natural gas liquids industry cannot be overemphasized. Today, about 30% of all domestic LPG is used to make petrochemicals and synthetic rubber.

These markets represent a profitable, year-round outlet for LPG. Edwards foresees a steady increase in the volume of products of gas liquids plants going into petrochemical uses.

Already, new petrochemical plant construction planned for 1958 and 1959 for the Texas Gulf Coast is close to $500-million. Petrochemicals now account for more than 25% of total tonnage of U.S. chemical production, and better than 50% of the dollar value. Hundreds of products are involved.

Natural gas is a very significant contributor to the annual petrochemical tonnage, and will increase in years to come.

While natural gas as a chemical raw material is relatively small in terms of total gas sales, it is the raw material for such high-volume products as ammonia, nitric acid, methanol, and various chlorinated products of methane and ethane.

Increased demands for ethane as a petrochemical raw material will, in turn, lead to modifications of present gas liquids recovery schemes.

Natural gasoline, not yet an important petrochemical raw material, is the subject of close scrutiny by chemical companies.

With the value of natural gasoline to the refiner becoming more and more problematic, Edwards expects natural gasoline to play an increased role in petrochemical production.

How will the growing role of petrochemicals affect the gas liquids recovery plant of tomorrow?

Petrochemicals will have little effect on the location of plants, but will affect processing schemes.

In areas close to petrochemical centers, extensive fractionation facilities may be in order. In other areas, remote from such centers, but connected to them by suitable pipelines, the best answer might be an installation doing nothing more than to demethanize or de-ethanize.

Increased emphasis on ethane for petrochemicals will expand the use of refrigeration in recovery and fractionation facilities.

Imposed upon present process schemes, refrigeration permits operation with low-molecular-weight oils for the retention of ethane in the raw feed liquid product.

Low-temperature fractionation plants may be installed in some areas. But smaller plants will probably install a minimum of fractionation, storage, and product handling facilities.

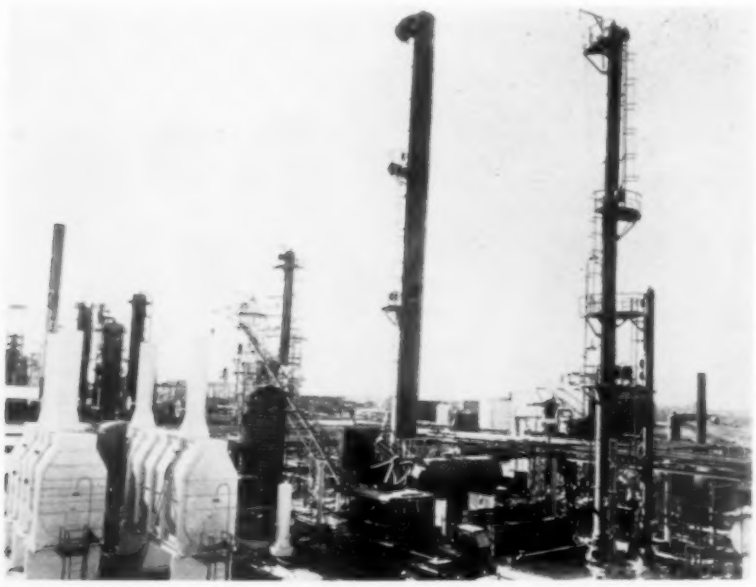
There will be a continuing search for processes and equipment to reduce fuel and cooling water requirements.

Increased use of economizers, turbine drivers, and refrigeration units to utilize the heat from secondary steam and hot exhaust gases will be more evident.

In many cases, utilities and services will be supplied by others to the economic advantage of the plant operator.

Process instrumentation will play a growing role in making operations more efficient and reducing labor needs.

A wide use of process-stream monitoring is in prospect. Chromatography seems to offer good possibilities for



New Alky Unit On Stream for Champlin

Champlin Oil & Refining Co.'s new HF alkylation unit at its Enid (Okla.) refinery is completed and on stream almost four weeks ahead of schedule. Capacity of the unit, which uses the Phillips process, is 1,430 b/d. Product will be used for blending into motor fuels. Engineering and construction for the plant were by Badger Mfg. Co., Cambridge, Mass.

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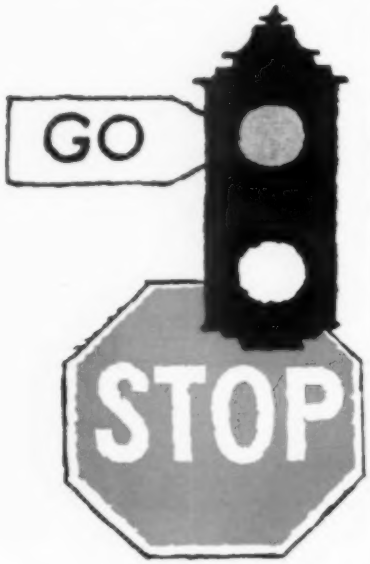

As auto makers continually develop more critical, more powerful engines — as "stop and start" motoring becomes more a part of everyday driving — good performance from lubricating oils becomes an increasing problem. Foreseeing this trend, Oronite, with five years of research, thousands of laboratory tests, millions of miles of road operation, is proud to announce the FIRST lube oil additive designed to meet the more precise requirements of modern-day gasoline engines — and the engines of the future.

Oronite's new "60" Series additives can provide you an important "first" in marketing a superior compounded motor oil for the present and future — in compounding single, dual or multi-graded oils of outstanding performance.

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plant operations because of its simplicity and low cost. Monitoring equipment will allow maximum product recovery without sacrificing specification control.

Since instrumentation has already minimized operating manpower, the fully automatic, unattended plant does not appear likely for some time to come—except for very small plants.

It is likely that, in the near future, there will be more joint-ownership gas liquids recovery plants.

The reason for this trend is the reluctance of gas producers to relinquish control over—and profits from—their production.

In addition, joint ownership is one way to justify large expenditures for central product fractionation, catalytic reforming, treating, storage, and other high-investment facilities, thus reducing unit handling costs.

Boiling Water Cools Engine

Ebullient cooling—the use of boiling water to cool compressor engines—is approaching rapidly the point where it will be attractive to the natural gas and natural gasoline industries.

Recent developments in the use of ebullient cooling for compressor engines were described at the recent Oklahoma City meeting of the Natural Gasoline Assn. of America. H. A. Witcher and H. Evans, of Sinclair Oil & Gas Co., told of advances—and problems—in the use of ebullition.

Ebullient cooling is basically simple. Heat from the engine is absorbed into circulating hot water, changing a portion of it into steam.

The beauty of the system is that, by letting heat from the engine enter the hot water (at or near its boiling point) to generate steam, about 15 times as much heat is absorbed as when 150F cooling-water is allowed to rise to 180F in a typical, conventional engine-cooling system.

This heat, from the cylinder walls, is absorbed into the 212F water, converting a portion of the water into steam. The steam in turn rises through the water, moving (and thus circulating) the water with it. Next it separates from the water.

After being separated from the water the steam is condensed, and the condensate returned to the cooling system. With such a system, the cooling water is always near or at its boiling point.

Many advantages are possible from a well-designed ebullient-cooling system. Among them:

- Installation costs are low. Such a system, compared to conventional water cooling, requires less heat-transfer surface to condense the steam leaving the engine jacket. Fan motors are smaller, and there is no need for jacket-water surge tanks, temperature controls, bypasses, water pumps, and water-pump drives.
- Operational reliability is high. The small number of operating and moving parts reduces the chance of equipment failure and shutdowns.
- Engine efficiency is high. Analysis of the ebullient-cooling system shows that it gives the engine a net gain in efficiency.
- Engine overheat is reduced. Ebulliently cooled engines will not overheat during continuous overloads, as shown by tests at a Sinclair compressor station. A similar compressor engine without ebullient cooling not only overheated, but sprang several gasket leaks.
- No salt is deposited in engine jackets. Sinclair found no calcium or other deposits in the water jackets of the ebulliently-cooled engines.
- Controls are simple. Other than a reliable pressure-relieving device, and perhaps a two-speed fan motor, no man-made controls are needed for the system.

But all is not gravy with ebullient cooling. There are some disadvantages—plus a number of "bugs" that have to be worked out of the technique. Among them:

- Engines may "detonate" under full load. The detonation (uncontrolled and rapid combustion of fuel, often evidenced by pinging, knocking, or rough-running engines) reduces engine capacity and efficiency somewhat at full load.
- Gasket failures are common. With the coolant at 212F (versus about 150-180F for conventional cooling) all rubber gaskets subjected to these higher temperatures must be replaced by heat-resistant materials (such as neoprene, Hycar, Hypolon, etc.) to prevent gasket failures.
- Cooling water can freeze. Unattended engines can be damaged by cold-weather shutdowns and freezing of the water. Coolants of gylcol-water and glycol-water-alcohol have been tried, but none solve the problem entirely. A coolant of glycol ether and water (Dow Chemical Co.'s Dowa-

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nol PM) appears to be a possible solution.

• Lube deposits are formed. Conventional lubes leave engine deposits on pistons and rings at the elevated ebullient-cooling temperatures. Sinclair researchers are attempting to develop new lubes, which will leave no deposits.

Even engine lube oils have been cooled by ebullition, with a resultant reduction in sludge and deposits.

There were no deposits of any kind on the pistons and rings of engines so tested by Sinclair. Valves were in good condition, but several pistons galled from an apparent lack of clearance between pistons and liners—not from lube oil failure.

There was no sign of corrosion by acids in the hot-oil engines. It is possible, according to Witcher and Evans, that keeping the temperature of the oil above the boiling point of water will reduce engine corrosion by reducing the amount of free water in the crankcase.

What's New / IN PROCESSING

North Star Oil, Ltd., plans to build a combination UOP Platforming-Unifining unit at its St. Boniface (Manitoba) refinery.

The 2,700 b/d unit will produce material of 100-octane or higher, leaded, to blend into motor gasoline.

Cost of the unit will be over $1-million. Procon (Canada), Ltd., will do the construction.

•

Hercules Powder Co. will put increased emphasis on fuels for chemical propulsion in industrial and military uses.

Though the company is an old hand at making rocket propellants, the work up to now has been done as an incidental activity of the company's explosives department. Now, however, a chemical propulsion division has been formed (within the explosives department) to investigate newer fuels for propulsion of rockets and missiles.

•

Queen City Oil & Refining Co., Dickinson, N.D., has filed a petition for bankruptcy.

The 4,500 b/d refinery has not been active for about two years. Its only outside income has been from rent of a garage and a filling station.

•

Ashland Oil & Refining Co. expects to have a new aromatics plant on stream by mid-April at its Frontier Division refinery, Buffalo, N.Y.

The plant has a capacity of 21-million gal. a year; it will be able to produce benzene, toluene, xylenes, and heavier aromatics in varying rations to meet market conditions.

Process designs, cost data, and several pilot plant studies have been prepared for additional facilities to make such products as cyclohexane, methyl cyclohexane, paraxylene, orthoxylene, and maleic anhydride from the aromatics.

•

A new rocket and missile propellant firm, HEF, Inc., has been formed by Hooker Electrochemical Co. and Foote Mineral Co.

The location for the new company's propellant production facilities has not yet been selected.

The joint venture is an effort to coordinate Foote's research in propellants and high-energy fuels with Hooker's production of sodium and potassium perchlorate (the oxidizers commonly used in solid rocket propellants).

•

Texas will continue to lead the nation in producing synthetic rubber for many years to come, according to H. E. Humphreys, Jr., chairman of the board of U.S. Rubber Co.

Texas now produces 46½% of the nation's synthetic rubber, 53% of the general-purpose synthetic rubber used in tires and other products, and 77% of the butadiene, main ingredient of synthetic rubber.

Leak Starts Fire at Petrochemical Plant

A leak in a liquid petroleum "pitch" tank started a fire at Portland Gas & Coke Co.'s Portland (Ore.) petrochemical plant, knocking out 20% of the plant's capacity. Two 14,000-gal. tanks of the tar were burned. Firemen prevented the fire from spreading to another large tar tank and to tanks holding 100,000 gal. of benzene and motor fuels.

The petroleum pitch is used by Gasco as a binder for making carbon electrodes for aluminum reduction potlines.

In Britain . . .

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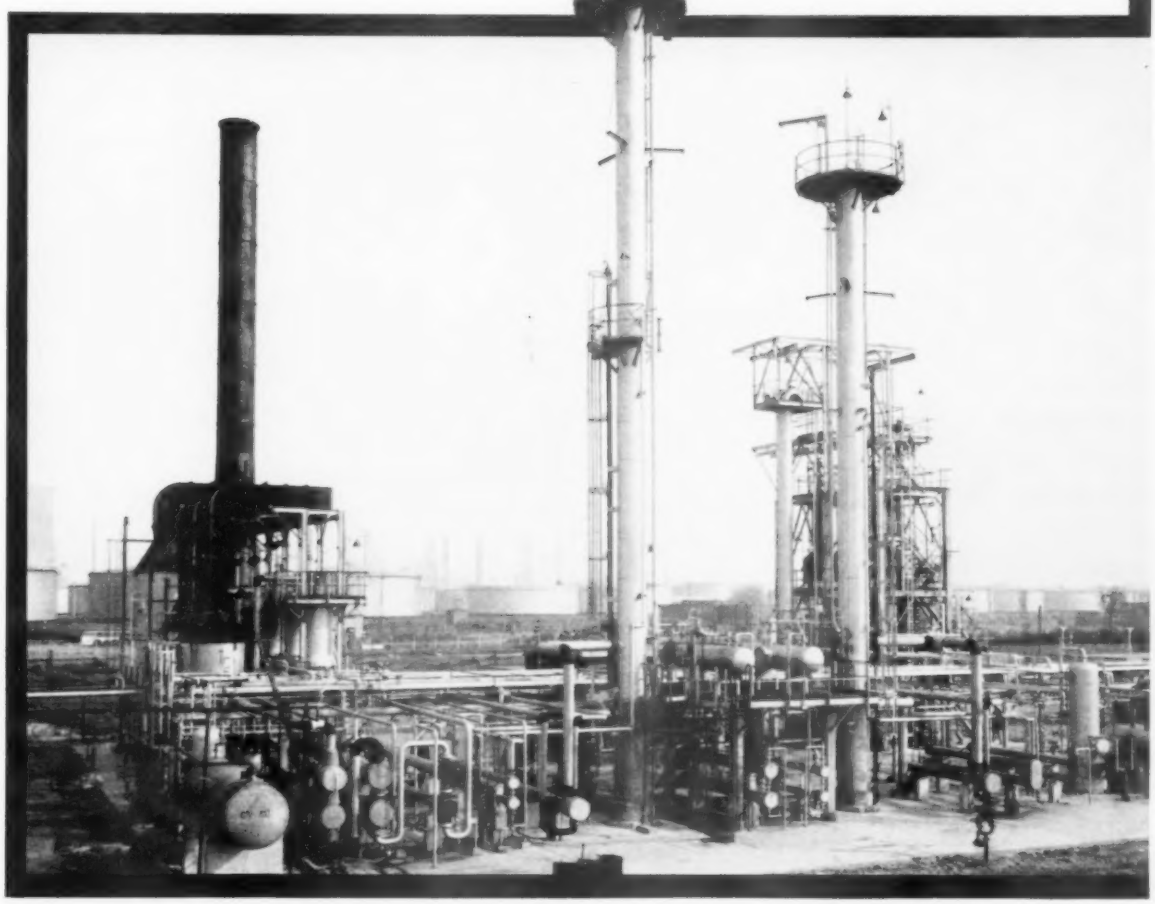

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Microwave Hits The Peak On Four Corners Line

The whirlybird airlift at the left is helping build the latest in microwave communications systems—the one now under construction for remote control of the Four Corners-to-Los Angeles crude line.

The 16-in. line, which will carry Aneth and Bisti crudes from the Four Corners area to California, is owned by Continental, Gulf, Richfield, Shell, California Standard, and Superior. Construction on it began last summer (PW—Aug.23'57,p32). Line fill began late last year.

The microwave system, a General Electric Co. product which will provide supervisory control communication for the 750-mi. line, probably won't be finished until after the line goes into service next month.

Like many new pipelines, the Four Corners line has been designed to run with unmanned pump stations. Instruments, instead of men, will handle the jobs of recording and adjusting conditions along the line. Among pipeliners, this form of automation is called "supervisory control" (PW—Jan.31'58, p44).

In such systems, microwave transmits the recordings made at pump stations to control center and returns any control "adjustments" necessary to keep operation of the line running smoothly.

R. W. Guthrie, Jr., of Shell Pipe Line Corp., which will operate the Four Corners line, told of its planned supervisory control setup at this week's spring meeting of the southwestern district of American Petroleum Institute's production division.

Said Guthrie: "When all the supervisory equipment has been installed, the pipeline can be operated from the terminal in Long Beach, Calif. Critical pressures and flow rates will be telemetered to the terminal operating panels; and in most instances, the pressure can be regulated from the terminal.

"Supervisory equipment will enable the terminal operators to start and stop pumps, open and close valves, observe oil level in tanks, determine the cause of failures, and control the station operation at all locations along the pipeline."

However, the microwave supervisory-control system won't be finished when the line comes on stream (G-E can only estimate that the complete system will be ready "sometime" later this spring).

But the 16-in. crude line is otherwise almost ready for service. Latest indications are that it will be pumping crude—with stations manned until the microwave system is ready—shortly after Apr. 1.

So far, only one of eight "repeater" (relay) stations in the microwave system has been completed.

Basically, a repeater station is a tower with two electronic "dishes"—one for receiving signals, the other for transmitting them.

The eight repeaters will be built near pump and pressure-reducing stations along the line, to pick up their operating condition signals and to return control signals.

Such stations are scheduled for Roof Butte (the one already built), Marsh Pass, Mt. Elden, Williams Mountain, Hualpai, and Granite, all in Arizona; and for Tip Top Mountain and Butler, Calif.

The repeaters at Roof Butte, Mt. Elden, Tip Top Mountain, Hualpai and Butler will have extra equipment to transmit signals to "spurs" in the microwave line—such as to the line's terminals at Farmington and Long Beach.

Rugged terrain is one reason for the delay in building the repeater stations, and a rough winter hasn't helped, either.

Both factors really came to bear on the construction of the Roof Butte station.

The station sits atop the 9,800-ft. peak in the heart of the Lukachukai Mountains, near the line's eastern (input) terminal.

Getting all the necessary equipment to the top of the butte in midwinter took some ingenuity (the peak is inaccessible by road even in summer; snow and freezing temperatures compounded the problem).

The solution, as it evolved, was to use perhaps, the oldest and the newest methods of transporting the materials.

Building materials—including sand, gravel, cement, and excavating equipment—went up the last 800 ft. by mule.

But that's no way to move delicate microwave components. So a new

The first crude line to California, due to go into operation next month, will be guided by the latest in remote control systems. But a snarling winter and forbidding mountains have made building the system a rough job.

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"jet" helicopter was brought in to deliver G-E's electronic equipment.

It took 21 'copter trips (picture) to airlift the three tons of microwave equipment necessary for Roof Butte.

Building of the rest of the repeater stations should move along much more quickly. The terrain, although rough, is generally far better than that of Roof Butte, and winter—G-E hopes—is just about over.

The rugged terrain has also been a blessing. The use of maximum elevation points for repeater stations, coupled with the "system gain" designed into G-E's microwave product, makes for exceptionally strong signal communication.

The high-altitude repeater sites and "system gain"—much like the volume on an ordinary radio set—will combine to give the system strong signals over extra-long distances between the relay stations. Three of these "paths" are over 100 mi.—twice as long as hops usually found in pipeline microwave systems.

In addition, a VHF system is being installed for voice communication along the line's entire right of way.

The VHF portion of the line's communication system will even provide communication with mobile radios in management cars.

What's New / IN TRANSPORTATION

First Atom Tanker— A Small Test Vessel?

If the first U.S. nuclear-powered tanker is afloat in 1961 as now planned, it will be an uneconomical transportation test vessel used primarily for ironing out problems for later, bigger atom tankers.

The Atomic Energy Commission and the Maritime Administration said last week that they were considering converting a tanker now under construction to nuclear power (PW—Mar.7'58,p6). If the studies conclude in favor of the conversion—and informed sources believe they will—the vessel, a 22,500-tonner now being built at Ingalls Shipbuilding Corp.'s Pascagoula (Miss.) yard, could be steaming under nuclear power propulsion in 1961.

It's still felt, as it has been for some time (PW—Nov.15'57,p142), that such an early nuclear-powered tanker will not be economically competitive with conventional tankers. But it is expected to lead to much larger atom tankers, which will be able to compete.

•

United Expansion OK'd

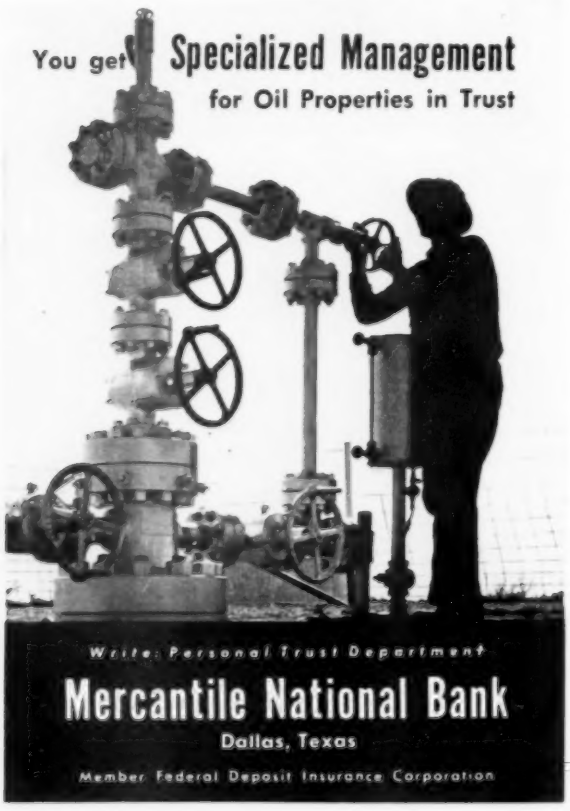
United Gas Pipe Line Co.'s plan to expand its transmission facilities between New Orleans and Mobile has been approved.

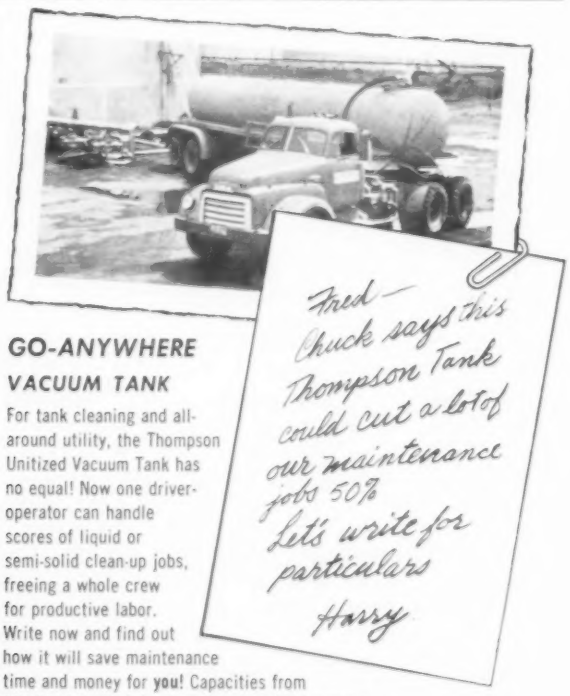
The Federal Power Commission approved the $33.7-million expansion plan last week. Mostly South Louisiana gas will be moved through the expanded system, which includes mainly 203 mi. of 30-in. paralleling.

•

The proposed big-inch natural gas line to California, now planned to originate in Southwest Texas, will tap newly-established reserves in Terrell County there.

Transwestern Pipeline Co., which will build the line, now expects to have its construction application be-





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fore the Federal Power Commission by Apr. 1. If approval is given, construction would begin in the fall.

Originally, the line was to have originated in the Four Corners area. In order to insure adequate gas reserves, however, the extension to Southwest Texas was necessary.

The Terrell County gas area is being developed by Magnolia Petroleum Co. and Western Natural Gas Co. Their discovery, No. 1 Brown-Bassett, section 218, block Y, TCRR survey, has just been completed from the Silurian zone for an estimated 75-million cu. ft. of gas a day through 36/64-in. choke (PW—Mar.7'58,p6).

•

Users of inland waterways may have to help pay for planned federal improvements on such rivers and canals.

Commerce Under Secretary Louis S. Rothschild recently said that his department is beginning a study to determine whether—and how much—inland waterway shippers should help pay for such improvements. The Budget Bureau requested the study.

•

Japan increased its lead as the world's top ranking tanker-building country last year, according to a recent Lloyd's Register of Shipping Statistics.

Japan built 36% of world tanker tonnage last year. Next in the tanker-building line was Britain.

•

Buckeye Pipe Line Co. will abandon its crude gathering lines in four southeastern Ohio counties.

As of May 1, Buckeye will pull out of gathering lines in Washington, Noble, Monroe, and Guernsey Counties. Buckeye says that the costs of running these lines have become greater than the income from their use.

•

Last year, Service Pipe Line Co.'s transportation revenue, although down from 1956, was greater than any other U.S. pipeline company, according to the Interstate Commerce Commission.

ICC reports that Service's 1957 revenue was $66,482,485, 5.3% below the company's 1956 revenue of $70,235,500.

•

Clark Oil & Refining Corp. is building a short products line from its Blue Island (Ill.) refinery to East Chicago. Midwestern Contractors, Inc., is laying the 15-mi line

New Hose Floats on the Delaware

That's new Quaker floater hose riding on the surface of the icy Delaware River during a recent demonstration of the hose by its maker, the Quaker Rubber Division of H. K. Porter Co. The floater hose, made in 250-ft. lengths, is designed for use primarily at shallow-water terminals to eliminate the need for bulky floater drums, which are now used to keep hose afloat for offshore loading or unloading operations.

The Quaker hose is part of a system that includes a reel and collapsible pontoons developed by the company for faster hose handling and storage space economy. The pontoons are attached as the hose is strung into the water from the reel. Length and number of pontoons depend on the number of 250-ft. hose lengths joined.

The hose is available in 4-in. and 6-in. diameter.

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TYPICAL BARINAS SCENE during rainy season shows Socony Mobil group with geophone cable trudging through knee-deep water.

Fifteen Dry Wildcats Fail to C

(Ninth in a series of on-the-spot Venezuelan reports)

BARINAS—Getting boiled alive in oil hasn't been a problem since Biblical days—but it is here in Venezuela's newest oil producing province.

This is about the hottest oil in the world. Literally. The crude comes gushing out of the wells into the flow lines at temperatures as high as 237F—hotter than boiling water.

"If a man should get accidentally sprayed, he'd be french-fried," explains Calvin C. Callihan, Barinas field superintendent for Socony Mobil Oil Co. of Venezuela.

"It's an unusual operating hazard," Callihan admits. "And a constant worry for us—in case a well should go wild, or a tractor should accidentally cut one of the flow lines near a well."

"Luckily, however, the wells are fairly easy to keep under control here, and we've trained our people to be very careful."

Reason for the unusually high temperature: a combination of deep production, with high bottom-hole temperature, plus a very low gas-oil ratio. That means that the normal cooling of the oil that occurs when the gas expands as it rises to the surface—the same principle as refrigeration by gas expansion—is absent. Later, of course, the oil cools off quickly in the flow lines. But when it comes out, it registers 237F in Socony's Silvan field and 190F in its Silvestre field.

"It's quite a sight after a rain shower," comments Martin Williams, administrator of Socony's western division. "You can watch the water puddles around the flow lines boiling merrily away."

(Ironically, Socony has just the reverse situation at its Guario field, in Eastern Venezuela. There the oil has a very high gas-oil ratio. The gas expands so fast that it condenses the moisture in the air, and causes ice to form on the flow lines right in the full tropical sun.)

* * * *

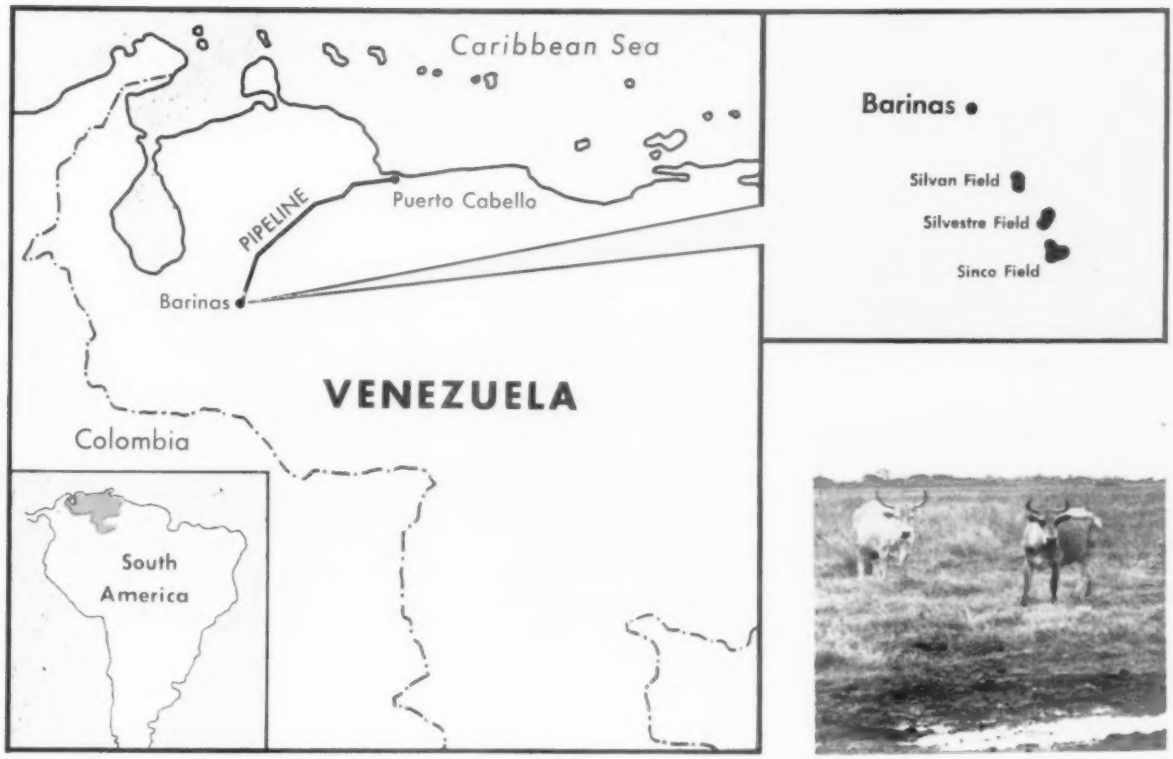
This is a "hot" oil area in another sense, too. Next to Lake Maracaibo, it's the site of the most intensive exploration in Venezuela right now.

Oil was first discovered in the Barinas-apure basin by Socony in 1947, and subsequently by Sinclair in 1953—the only two long-time concessionaires here. But development was slowed in this most isolated Venezuelan oil province by lack of an outlet to markets.

This was finally solved last November with the opening of a giant 210-mi., 20-in. pipeline from Barinas to the Caribbean port of Puerto Cabello (map). The line was built at a cost of $26-million, and is owned 75% by Socony and 25% by Sinclair.

* * * *

As a result, many companies evidenced keen interest in acquiring concessions in this region during the recent Venezuelan bidding. Three new groups—Creole Petro-



210-MI. PIPELINE has opened up Venezuela's most isolated oil province.

CATTLE GRAZING dominates scene.

Cool Off 'Hot' Oil Area

leum, King-Mill Syndicate, and an Atlantic-Sun-Pan American combine—acquired acreage, on bids ranging as high as $787 per acre.

Fifteen seismic groups are now active in the area, plus numerous surface geological parties. All the companies except King-Mill are running exploratory rigs, with at least ten wildcats scheduled for completion before May.

Activity is at a high pitch because all work must be concentrated during the short, four- to five-month "dry season" between December and early May.

After that, these vast, flat, grassy plains of Venezuela's great cattle-ranching area, or "llanos," become one vast, impassable mud-puddle and swamp. It rains almost incessantly, with flash floods causing the rivers to overflow (the rivers sometimes rise as much as three feet in a few minutes), leaving much of the land under water for months at a time.

The cattle, even after scampering to "high land," often stand knee deep in water. So do the oil men (picture). Oil traffic has to be confined to the few surfaced roads in the vicinity of the fields.

* * * *

The new oil activity is quite a shot in the arm for the sleepy, 200-year-old cattle town of Barinas.

Unlike other more bustling areas of Venezuela that have jumped virtually from the ox-plough to the jet age in a decade, Barinas is like a page out of history.

The town, actually, is reminiscent of the old California Spanish settlements: a central church, one-story freshly painted adobe buildings, and narrow dirt streets. The pace of life is still leisurely, with the townspeople strolling in the central square, around a statue of Venezuela's liberator,

SOCONY AND SINCLAIR officials discuss problems of their joint pipeline. Left to right: Martin Williams and Calvin Callihan, Socony; and Carey Summy and Jud G. Taylor, Sinclair.

Simon Bolivar, in a neat little park. (A statue of Franklin D. Roosevelt stands neglected in an overgrown clump of bushes in an adjoining square. No one seems to recall quite how it got there.)

* * * *

But you can already see the stirrings of the new prosperity. More and more shops are filled with shiny plumbing fixtures, refrigerators, and deep freezes. Here a street has already been paved, and you can drive through without risking the axle of your car; there another is being widened. Here and there, too, stands a new modern house, stuck right in between the old, or the skeleton of another in the process of going up.

One odd touch: Almost everywhere you look you see men busily sweeping the streets, their faces covered with what look like gas masks (as protection against the dust)—resembling misplaced creatures from Mars with brooms.

Outside of town stands, a plush, brand-new government hotel, built in the hope of enticing tourists. It is connected with Barinas by a four-lane superhighway, lit by shiny mercury lamps (not working at the moment because the local power plant blew out and new equipment hasn't arrived yet).

* * * *

In many ways, the Barinas oil story is a classic example of the big, calculated risks involved in oil exploration—the high costs, and the long time often required before even a successful venture can start paying out.

Take Socony, for example. It took the company 17 years of effort, and an investment of about $75-million, before it was able to get its first barrel of oil out of here. Socony first started exploring for oil in Barinas in 1941. After six dry holes, it made its initial discovery in 1947: the Silvestre field about 22 mi. southeast of Barinas town. Subsequently, it found the Silvan field, a few miles to the northwest.

While these are good-sized fields, they're not lush by Venezuelan standards. Present producing capacity of the two fields is about 35,000 b/d, which is expected to be boosted to 45,000 b/d by further development.

The "in place" reserves of the two fields are something in the order of 400-million bbl. But there's a catch to this figure. The big question: How much of this oil is actually recoverable?

Since the oil contains virtually no gas, much depends on how effective the water drive will turn out to be—and this is still unknown.

The same question applies to Sinclair's Sinco field, discovered in 1953 a couple of miles south of Silvestre. The field is currently producing about 30,000 b/d, with 37 productive wells, but it can be stepped up to 50,000 b/d.

* * * *

And the results of the new wildcatting so far have been quite disappointing. The first four exploratory tests completed this season have been dry.

Creole's first wildcat on its new concession block, 15 mi. southwest of the Sinco field, was recently abandoned. The company is now drilling its second, 8 mi. northwest of the first.

Similarly, Venezuelan Atlantic has now abandoned its first exploratory test, 7 mi. southwest of Sinco, and is drilling a second a couple of miles to the northwest.

Socony's first two wildcats of the current season were also dry: one at San Vincente, about 38 mi. southeast of Silvestre and one at Calzada 30 mi. southwest of Silvestre. The company is now drilling another test at Calzada, about 4 mi. west of the first, and another at Rosalia, about 65 mi. southwest of Silvestre. Socony is running three exploratory rigs, the other companies one each.

(Two of the Socony rigs are under contract from Loffland Bros., which, incidentally, represents Socony's first use of contract drilling in Venezuela. All the others in Barinas are also using contractors.)

* * * *

In fact, the net result so far of all the exploratory drilling during the past three or four years has been 15 dry holes.

The whole productive area so far is still confined to the original three Socony and Sinclair fields—which can be fitted into a rectangle no larger than 5 by 15 mi.

Though the results so far are not encouraging, the oil companies here are still relatively optimistic, because of the large amount of acreage that remains to be explored. Socony alone, for instance, has concessions covering nearly 1.3-million acres, and Sinclair some 625,000 acres. The total area under concession is well over 2-million acres. In addition, there's some three to four times that amount of open acreage.

"It's beginning to look as if the Barinas area may not be so juicy as some people thought earlier," is the way one oil man sums it up. "But it's far too early to jump to conclusions. This region has barely been scratched so far."

DEPT/International

Sahara Push

PARIS—Sahara oil exploration, already a $100-million-a-year proposition, is due for a boost this year as new oil groups—including U.S. companies—get into the desert oil push.

Exploration is being started immediately by the eight groups (see map) to which new permits were allotted last month on acreage relinquished around the Hassi Messaoud oil field (PW—Feb.28'58,p46).

Cities Service and Phillips Petroleum were the first U.S. firms to win oil rights with their French partners, while Sinclair Oil, with Newmont Mining, will join their ranks shortly when the permits allotted to their group last month are actually granted.

Also making its entrance is British Petroleum Co., through its 50%-owned Soc. des Petroles de Valence.

Two French newcomers are the independent PETROSAREP, of the Nahmias Brothers' Petrofrance group, and Soc. Nationale des Petroles d'Aquitaine.

Due to the relatively small size of the tracts parceled out last month, some groups may pool their acreage.

Cities Service may extend its interests immediately, through 15% participation in a big southwest Sahara permit granted last August to Cie. d'Exploration Petroliere.

According to CEP, a decision may be made this week on a joint venture for its 34,374-sq. mi. Reganne permit, in which three oil finance outfits would hold a total of 24½% and Cities Service 15%.

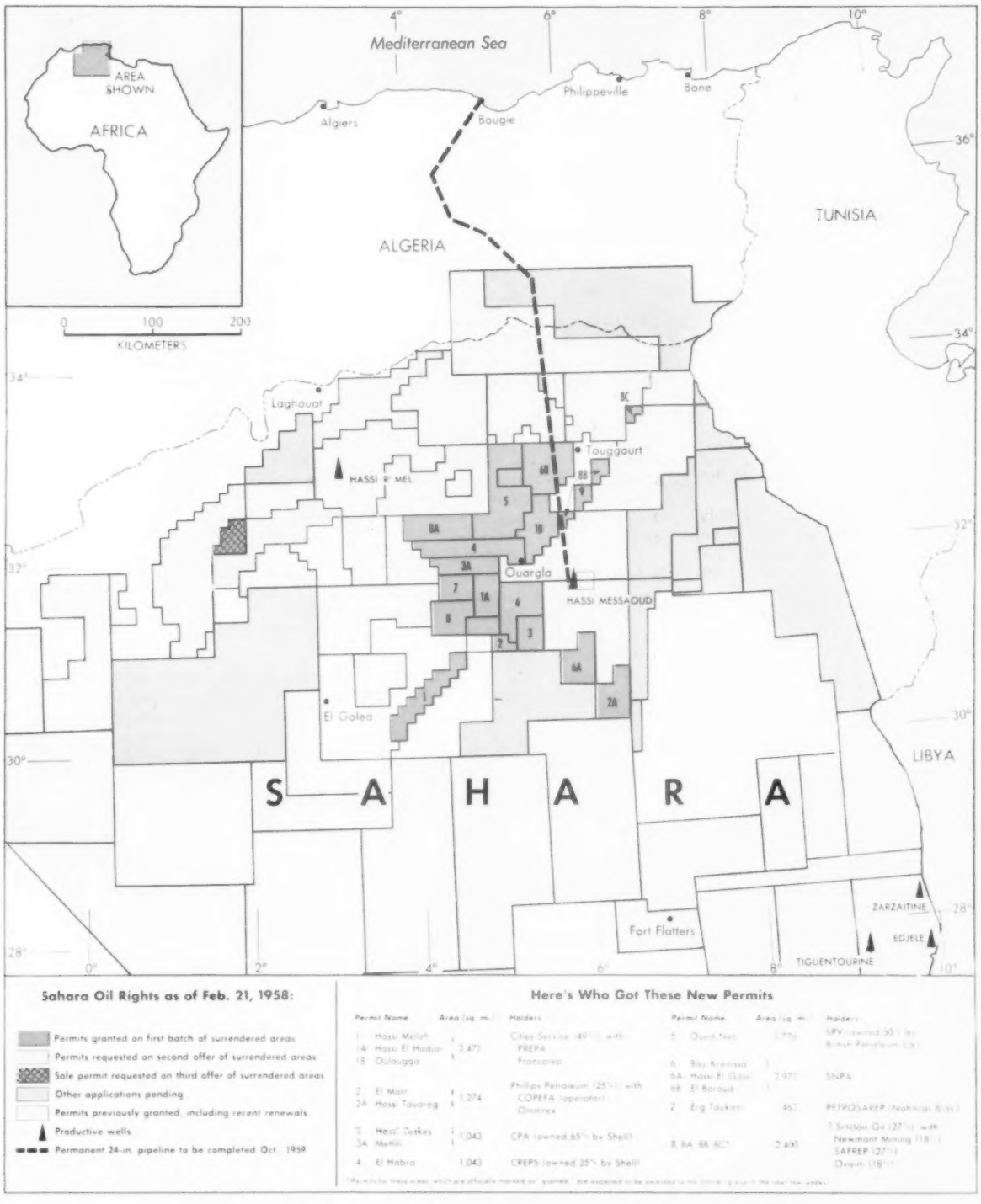
Further U.S. oil interests may get their first Sahara grants in the next distribution of relinquished acreage, while those who won tracts last month also hope to get another slice.

The 11 applicants for a 14,000-sq. mi. area offered in December include Indiana Standard, Clint Murchison's Canadian Delhi, and Transworld Petroleum, D. D. Feldman's French affiliate.

SPV, the British Petroleum affiliate, was the only applicant on a third 4,633-sq. mi. area in January.

U.S. firms also may be in the running for new eastern Sahara tracts, and for other lands—including areas around the CREPS oil finds near Libya—that will become available this year as present permits expire.

Gets Boost as U.S. Firms Join Oil Hunt



From latest official map of French government's Bureau de Recherches du Petrole

What's New / AROUND THE WORLD

50-50 Law for Sahara?

SAHARA—Oil operations would be put on a straight 50-50 profit-sharing basis like that standard in the Middle East under a proposed new Sahara mining law.

The draft of the new law is shortly to be submitted for approval to France's Sahara Minister and the French Cabinet. Government oil officials in Paris hope it will be put into effect within a few months.

Under the draft law, oil companies operating in the Sahara would pay royalties, plus taxes, totaling 50% of profits.

The draft provides for a depletion allowance, but details had not yet been finally decided on last week.

No bonuses would be required, nor would oil companies be subject to any indirect taxes. The draft also provides that exploration costs can be amortized in the first year of oil production or over a longer period.

Under the present French mining law covering Algeria and the Sahara, oil companies pay no royalty, but rather normal corporation taxes, plus a surtax on the difference between what the government considers a normal profit margin and actual profits earned.

•

FRANCE—Royal Dutch Shell's projected refinery in the Strasbourg area will have initial capacity of at least 60,000 b/d (PW—Mar.7'58,p70).

Caltex is considering participation in the plant, which will be built by Shell-Berre, a refining affiliate of Royal Dutch Shell.

The plant is the latest of three new refineries projected for eastern France.

Studies on a proposed 22-in. pipeline to feed the plants from the Mediterranean are now nearly completed, with expectation that it may be built by 1962.

•

IRAN—A Japanese refiner is preparing to make a straight 50-50 profit-sharing bid on Iran's new offshore oil rights, unlike the 56-44 deal that Saudi Arabia recently concluded with a Japanese non-oil group.

"In our opinion, the principle of 50-50 sharing of profits is the best," the chairman of Idemitsu Kosan Jk.K., said in Teheran last week.

The official added that his company will not propose a 75-25 deal like the partnership venture between National Iranian Oil Co. and Italy's AGIP Mineraria.

The company is among 23 oil firms that recently submitted qualifications for bidding on District I Persian Gulf acreage.

According to an official NIOC statement, the total included 19 U.S. companies, two Canadian, one Dutch, and one Japanese. Out of these, NIOC accepted 22 as qualified.

•

THAILAND—U.S. and European backing is being sought by the local promoters of a shale oil venture in which the Japanese will hold 49%.

A joint Thai-Japanese operating company is now being formed, with ⅔ of the $24-million capitalization to be supplied by the Japanese. It would develop an estimated 3-billion tons of shale in northwestern Thailand, where the reserves are said to have 26% oil content.

The Thais have already reportedly approached a U.S. oil company and a Swedish shale producer for participation in their share. They also hope to get funds from the International Cooperation Administration.

A Japanese company called Oil Shale Exploitation Investment is now being incorporated for its share of the venture by a half-dozen Japanese firms, which expect to get financing from the Japan Export Bank. They are backed by Dowa Mining Co., headed by Hidesuburo Kurushima. He also headed the Southern Manchurian Railway Co.'s Fushun shale operation, which supplied two-thirds of the Japanese military's oil needs during World War II.

A spokesman in Tokyo said last week that present plans call for mining 4,500 tons of shale, producing 6,000 b/d of oil in the first stage. The project, he said, is a long-standing one, based on recommendations of U.S., Swedish, and Japanese geologists.

•

ARGENTINA—If foreign oil companies are invited to develop Argentine oil under a proposed contract plan, they would bear the entire exploratory risk—in return for repayment only by a percentage of any oil produced.

This is the plan proposed by Dr. Mauricio Yadarola, Argentine Ambassador to the U.S. Its full text was recently released as a trial balloon by the provisional government (PW—Mar.7 '58,p70). Here are the highlights:

- YPE, the state oil entity, would make "service-location" contracts with private companies through public tenders for specified areas.
- Tenders would set minimum annual investment obligations and annual payments to be made to the state until oil production starts.
- The contracting company would supply all capital and equipment required for exploration and development, and for delivery of any oil produced to YPF.
- No reimbursement will be made if oil is not found in marketable quantities.
- The percentage of oil to be paid for services will be set in accordance with a maximum scale for each area.
- The company cannot export any oil received in payment for services until domestic oil needs are met and reserves reach a figure stipulated by the government.
- At the end of the contract, all equipment and other assets within the contract area become YPF property, free of charge.
- Imports of equipment required to fulfill the contract terms will be tax-free.

•

CHILE—The government oil company is apparently set for the projected 24,000 b/d boost in the capacity of its Concon refinery, now rated at 20,000 b/d.

M. W. Kellogg Co. is handling design, engineering, and procurement.

Empresa Nacional del Petroleo will get a new 24,000 b/d atmospheric and vacuum crude unit, a 12,000 b/d Orthoflow fluid cat cracking and gas recovery unit, a 6,000 b/d cat desulfurization and reforming unit, and a 1,100 b/d alkylation unit.

Construction will be handled by ENAP and a Kellogg subsidiary.

•

GUATEMALA—The first wildcat in Guatemala has encountered a non-commercial gas show at 1,020 ft.

The test, No. 1 Carlos Castillo Armas, is located in Izabal, 27 mi. from Puerto Barrios and is now being drilled ahead. Coastal Plains Oil Corp. has scheduled additional drilling for 6,500 ft.

An overriding royalty on the company's 130,000 acres is held by Southwest Oil Corp., N.Y.

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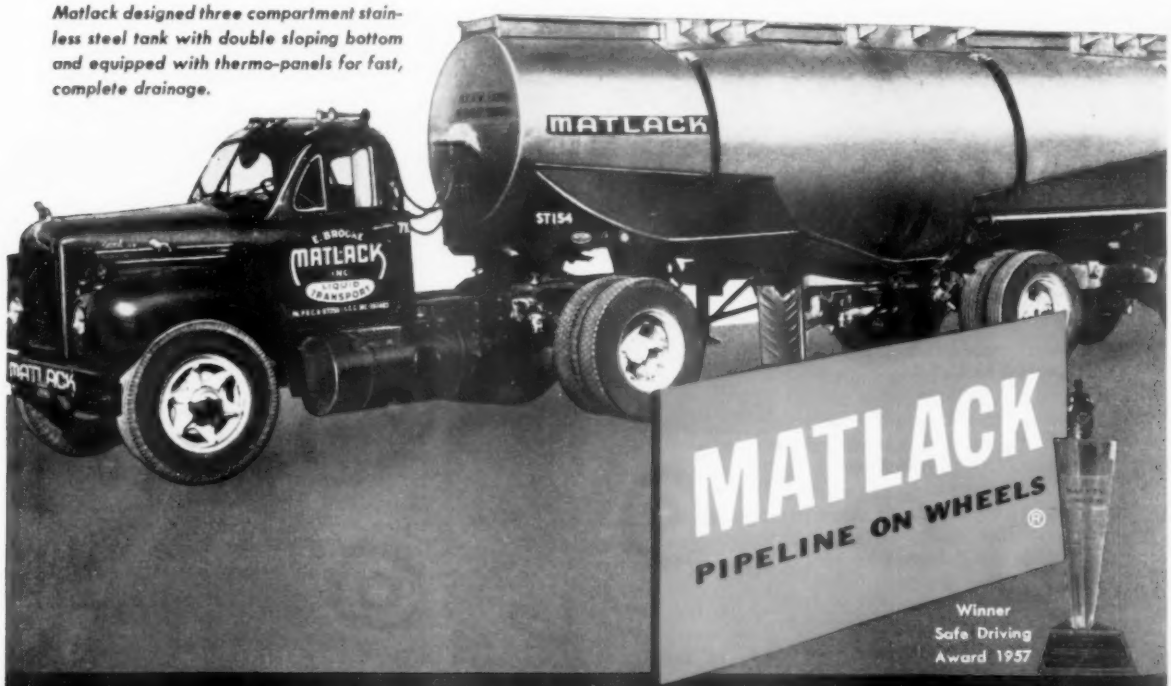

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DEPT/Marketing

Oil-Heat Men Gird for Battle

Oil-heat marketers and distributors are getting set for the big spring push to win more home-heating customers.

Faced with deeper and deeper inroads into their markets by gas heat, and with tougher economic conditions, oil-heat men are more determined than ever to hang on to their share of the home-heating markets. This month, suppliers and distributors alike will embark on a concerted effort to get new customers and to sign up old customers for another year.

In 1957, sales of oil burners dropped 14%. Through January, the current heating season had brought marketers warmer-than-usual weather and a resultant drop in volume. Fortunately, this was largely offset by the much colder weather in February.

Estimates by several marketers last week were that volume through February would be up to last year's—perhaps ahead.

The biggest problems facing them in the year ahead: meeting gas-heat competition and improving customer service.

As of the first of the year, there were 9,057,742 oil-fired central heating units, compared with 9,812,052 gas-fired units. Percentage estimates of oil's share of the home-heating market vary from 42% to 48%.

Says one major company fuel oil manager: "Gas competition is the biggest threat to our markets. Any time you introduce a fuel as good as natural gas, you've got some real competition to cope with. We're not really worried about losing our market to them, but we know it's going to be a tough fight."

Most oil-heat marketers look to service as the key to building bigger volume.

This means increased supplier and distributor efforts to find and train good mechanics for burner-service work. Burner service is sometimes supplied directly by the company, sometimes by distributors, and sometimes, via farm-outs, to local burner-service companies. But the supplier, ultimately, is responsible for giving satisfactory service.

Some of the services getting more emphasis: attractive "budget" plans to spread payments out; guaranteed fuel savings; emergency repairs; automatic deliveries with once-a-month billing; and guarantees on parts and burner adjustments.

Most oil-heat men are banking on the power of "positive promotion" to change the public's currently negative attitude toward oil heat.

A recent survey by Esso Standard shows that 50% of oil users have a negative attitude toward the fuel. They think it's unclean, smells bad, is dangerous—and they don't like the need for burner service. Only 10% of gas users were shown to have such negative feelings toward gas.

"It is very necessary for us to take the positive tack in our oil-heat promotion," says a major supplier spokesman. "Where we used to say that we offered 'delivery with no spillage' and other such negative ideas, we now have to convince the public that 'oil heat is the cleanest, most modern fuel,' because this is the positive approach of gas heat."

To back up this promotion, there's a growing trend toward improvement of heating oil quality by using more costly refining processes.

"Heating oil quality is more of a problem than it used to be," says one marketer, "because we refine as much of the lighter ends into gasoline as possible. Nevertheless, heating oil quality is better than it's ever been as a result of hydrogenation processes that reduce the sulphur content. More and more refiners will be forced to upgrade their fuel oil through such processes."

One fuel oil man says he feels that economics throw a smoke screen over any talk about quality.

"Anyone can have a top-notch quality fuel oil if the economics permit it," he says. "A meat packer can have delicious hamburger, too, if he wants to grind up the sirloin to get it."

The conventional degree-day system may be in for some revamping by some marketers—as they search for ways to improve delivery service.

Esso Research has already announced that it is experimenting with a new system, which takes into account more variables than the conventional system. Another company says it has been working on some refinements of the system for two years, and is now giving them field tests. Besides improving delivery service, it hopes to use the new system to highlight burner-service trouble spots.

There are just as many marketers, however, who feel that the current system is adequate.

"The improved accuracy might change delivery by one day," comments one, "but we would never let a customer's reserve supply get that low. Besides, every system has to allow for judgment and variations."

The most universal note of optimism among oil-heat marketers: the future potential for oil-fired combination air-conditioning and heating units. But here again, gas will offer tough competition.

Such a unit was developed jointly last year by Esso Research and Servel, Inc., but fell by the wayside when Servel went out of business. Esso, however, is still working on the project, and is looking for an equipment manufacturer to make the oil-fired units. One or more companies reportedly are interested. In addition, two other majors have indicated that they are working on the development of such a unit.

There's a growing undercurrent of feeling that gas prices may be forced higher—giving oil heat a better chance to compete.

Pump a la Satellite

The world of sputniks moved into gasoline merchandising when a Shell dealer in Huntington Park, Calif., near Los Angeles, put this motor-driven spinner up over his pumps. When the Russians launched their dog-carrying Sputnik, he capitalized on the outer-space theme, tying in Shell's X-100 lube can. Just to make sure his ingenuity wouldn't go unnoticed, he hid a recorder in a nearby tire display to send out the familiar "beep-beep" and "woof-woof" sounds.

What's New / IN MARKETING

The recurring issue of using grain alcohol in gasoline has been stirred up again. Rep. Ben F. Jensen (R., Iowa) last week urged the Senate Agriculture Committee to approve legislation requiring the use of 5% of grain alcohol in motor gasoline. A companion measure has been sponsored by Sen. Karl E. Mundt (R., S.D.). Similar bills in the past have failed (PW—Jan.25'57,p17).

Jensen claims that such a bill would help farmers by compensating for the switch to automobiles from horses—which used to consume grain that is now surplus. He also slapped at "oil interests" that oppose his bill, saying that they "control Congress and fear a drop in oil consumption."

•

California's Gov. Goodwin J. Knight met last week with dealer representatives to discuss their plea to put gasoline pricing under state control (PW—Jan.31'58,p46).

The board of directors of the California Federation of Service Stations sought to persuade Knight to put its proposal before the current special session of the state legislature, limited to budget matters and emergency legislation. Knight earlier declined to get involved in price war problems, turning the matter over to Attorney General Edmund G. Brown.

•

Speedway Petroleum, for more than 25 years a single-grade marketer of gasoline in Michigan, is trying out two grades in the Port Huron and Flint areas.

The former Speedway 79 gasoline will be sold as Speedway Extra. It will sell at regular-grade prices, although it will still be considered a premium-grade fuel (about 95 octane). The new grade—Speedway Super Premium—will sell at 3¢ per gal. more.

The company reportedly will extend the two-grade system throughout the state, if the experiment in these two areas is successful.

•

Wilshire Oil Co. is continuing to expand its California market, by moving into the northern and central parts of the state. The company entered the Southern California market last year.

Wilshire—now being acquired by Pontiac Refining Corp. (PW—Feb. 14'58,p8)—has more than 550 retail outlets in California.

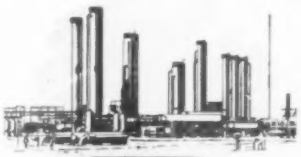
"Wilshire will continue its California expansion," says President Edwin C. Coopman, "and is also exploring opportunities in other western states."

The most recent move involves more than 200 outlets, extending from Santa Rosa on the north to Bakersfield on the south.

•

The Federal Trade Commission has approved a consent order prohibiting Lincoln Oil Co., of Boston, from selling its reclaimed oil products as "new or unused."

The order requires Lincoln to state on its containers and in its advertising that the oil has had prior use. An FTC complaint, issued in 1956, charged that the company did not disclose that its oil was reclaimed.



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DEPT/Personals

L. O. CROCKETT, a director of Goodrich-Gulf Chemicals, Inc., has been elected president and chief executive officer. He succeeds **W. I. Burt,** who moves up to board chairman. Crockett, now vice-president of petrochemicals for Gulf Oil Corp., will move to Cleveland to assume his new position on Apr. 1. Goodrich-Gulf is jointly owned by Gulf and B. F. Goodrich Co.

L. O. Crockett

C. A. Schrader

CHARLES A. SCHRADER has been elected president of Leonard Crude Oil Co., Mt. Pleasant, Mich., a subsidiary of Leonard Refineries, Inc., Alma, Mich. He succeeds the late **Delbert Y. Hewitt.** Schrader has been administrative vice-president for supply and transportation with Leonard Refineries since January, 1957.

BEN R. HOWARD has joined Republic Natural Gas Co., Dallas, as chief geophysicist. He was formerly chief geophysicist for Warren Petroleum Corp.

LUTHER E. BEISWANGER has been named director of industrial engineering for the organic chemicals division of American Cyanamid Co., New York. He has been with the company since 1940.

HAROLD J. POTTS has been elected chairman of the Middle Atlantic district Oil Information Committee. He is division manager of Socony Mobil Oil Co., Philadelphia. The new district vice-chairman is **Jack A. Lorimer,** Esso Standard Oil Co., Philadelphia. State chairmen elected to the committee are **James B. Kelley,** Gulf Oil Co., Pennsylvania; **J. H. White,** Atlantic Refining Co., Delaware; **John R. Sherwood,** Sinclair Refining Co., Maryland; **A. T. Sanders,** Esso Standard Oil Co., Virginia; and **Graydon M. Nowlan,** Elk Refining Co., West Virginia. **R. C. Chase,** Shell Oil Co., will represent the District of Columbia.

JOHN VANDERVOORT, ERNEST R. JOHNSON, and **RUSSELL D. BONNEY** have been appointed district sales managers at Hackensack and South Amboy, N. J., and Holyoke, Mass., respectively, by Sun Oil Co. VanderVoort succeeds **John E. Maloney,** who has retired. Johnson replaces VanderVoort at South Amboy, and Bonney, former motor products manager at Hartford, Conn., succeeds Johnson at Holyoke. In the Philadelphia research and development department, **W. Herman Barcus** has been named manager of the newly created research service division. **Robert W. Donahue** becomes manager of the product development division, replacing Barcus. **Stewart S. Kurtz, Jr.,** formerly head of the analytical division, takes over as research scientist, a new scientific professional classification.

L. W. DONNELLY, former senior engineer, has been promoted to engineering supervisor at Monsanto Chemical Co.'s plastic division plant at Texas City, Tex. Another appointment at Texas City is that of **Edgar B. Peek** as a member of the engineering department. At Monsanto's plastics division, Springfield, Mass., **Joel H. Graham** is named a safety engineer, **Dr. Irving Tashlick** a member of the research department, and **Richard A. Eckhart** a technical trainee.

RALPH M. STOTSENBURG has been appointed director of section activities, and **THOMAS K. HODGES** director of information, for the Instrument Society of America's national headquarters staff, Pittsburgh. Stotsenburg was formerly a sales manager with Robertshaw Fulton Controls Co. and a committee chairman, Philadelphia section, ISA. Hodges was most recently press secretary to the governor of Pennsylvania.

SMEAD STUART and **J. B. WARMACK** have formed Magnolia Drilling Co., at Magnolia, Ark., with one rotary rig, which will operate in southern Arkansas.

PAUL E. FIEBIG succeeds **L. M. Oles** as landman of Sinclair Oil & Gas Co.'s Amarillo (Tex.) district. Oles has taken a leave and will retire this year. Fiebig has been senior landman at Amarillo since July, 1956.

J. A. WARKE will take over as assistant coordinator of joint operations on Apr. 1 for Mobil Oil of Canada, Ltd., in Calgary. Succeeding him as district operations superintendent in Calgary will be **A. A. Halkers,** now Weyburn (Sask.) field superintendent. In Edmonton, **S. M. Thorne** will become district operations superintendent. He has been field petroleum engineer and district engineer for the company.

J. A. Warke

J. S. Collins

J. SPENCER COLLINS will manage exploration for Tennessee Gas Transmission Co.'s producing division, Houston. Collins, formerly staff manager of exploration, will be in charge of domestic and Canadian operations.

HOWARD A. McKINLEY has become manager of land in Continental Oil Co.'s foreign department, Houston, a newly created post. He was formerly land superintendent of Conoco's CATC marine region.

H. A. McKinley

G. F. Hornaday

GEORGE F. HORNADAY has been made manager of Houdry Process Corp.'s research and development division, Philadelphia. Hornaday, who has been associate manager of the division since December, 1956, heads operations at the Linwood (Pa.) laboratories.

CLARENCE E. GOLDSMITH has been elected a director of El Paso Natural Gas Co. Goldsmith is a limited partner in the New York investment banking firm of White, Weld & Co.

CAPT. J. W. ROSS succeeds Capt. **W. M. Hutchison** as chief marine superintendent of BP Tanker Co., Ltd. Hutchison has retired after nearly 39 years' service with the company. Ross, with the company since 1921, was most recently deputy chief marine superintendent.

ERNEST P. MILLER, chemical engineer, is on an 18-month assignment in Rio de Janeiro, for Petrobras, government-owned Brazilian oil company. Miller, who is associated with Cameron & Jones, Inc., consulting chemical engineers of Denver, will be concerned with the petrochemicals development program of Petrobras.

CLIFFORD W. YANCEY has been elected a director of Rowan Drilling Co., Ft. Worth. He will continue to supervise the company's Gulf Coast division at New Orleans, which includes offshore work as well as barge rigs.

ROY A. BOBO, Phillips Petroleum Co., Houston, is the new chairman of the API's southern district, division of production. He succeeds **Ben F. Carter,** Union Producing Co., Shreveport, La., who becomes advisory committee chairman. Nine vice-chairmen and their districts are: **Walter Kalteyer,** Hunt Drilling Co., Corpus Christi, Southwest Texas; **Earl Thomas,** Sun Oil Co., Lafayette, Southwest Louisiana; **Charles D. Schutz,** consultant, San Antonio, Balcones area; **C. J. Russel,** Arkansas Fuel Oil Corp., Shreveport, Ark-La-Tex.; **Isaac Ault,** Magnolia Petroleum Co., Morgan City, Southern Louisiana; **W. W. Wilson,** Lane-Wells Co., Alice, Rio Grande Valley;

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Cable Address—Branbarco

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POSITION WANTED

Personal Pilot—Executive Assistant, married, age 26. Have comm'l pilot's lic. and will receive Master's Degree in Bus. Admin. from Univ. of Okla. in June. Resume on request to Box 4696 WWC, Norman, Okla.

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Corporations with business potential which need capital and/or revitalized management. We have large amount of money, expert personnel and avid desire to acquire control of sick corporations with a future. Submit latest balance sheet, annual report, and other information to arrange personal interview. Will pay finder's fee on strictly confidential basis.

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BUSINESS OPPORTUNITIES

Use this Classified Advertising Section for bringing business needs or opportunities to the attention of men associated in administrative, executive, management, sales and responsible technical, engineering and operating capacities within the oil industry.

PETROLEUM WEEK

Joel Battle, The Texas Co., Houston, Texas Gulf Coast; **Sam Cox,** East Texas Engineering Assn., Kilgore, East Texas; and **W. L. Massey,** Alcoa Mining division, Port Lavaco, South Central Texas. Another newly elected officer is **J. B. Flemming,** Welex, Inc., New Orleans, secretary-treasurer.

JOHN PEAKE, former secretary of the Pembina Engineering Committee, has joined Canada Cities Service Petroleum Corp. as head of the reservoir engineering department, in Calgary.

C. J. G. LEESEMANN will head the supply and coordination division of Humble Oil & Refining Co.'s Houston office. In the production department, four district superintendents have been reassigned. **A. M. Orr** goes from the Scott & Hopper district to the Imogene district, in the Southwest Texas division; **Frank Bass** goes from the Kelsey district to the Scott & Hopper district, succeeding Orr; and **J. E. Cox** takes over the Bakersfield (Calif.) district in exchange of jobs with **J. F. Jeansonne,** who replaces Cox in the Castaic Junction (Calif.) district. At Humble's Baytown (Tex.) refinery, **J. Q. Foster, F. C. Stehling,** and **Lowell Westerman** have joined the research and development division.

C. J. Leesemann

J. R. Ashley

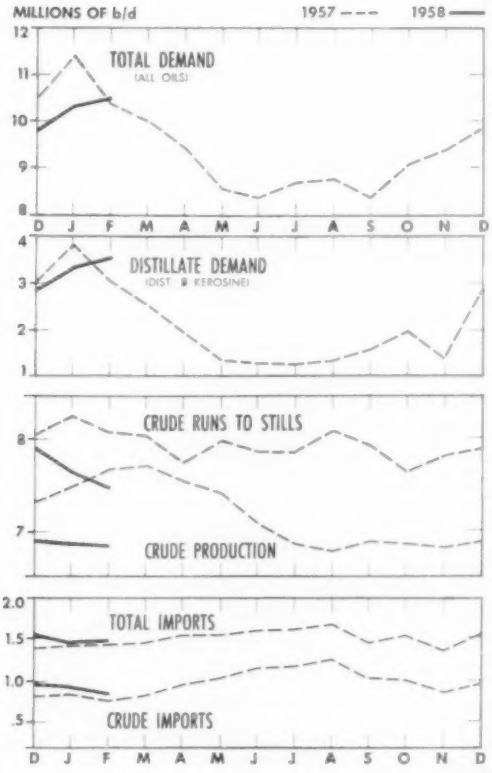
J. R. ASHLEY replaces **D. H. Levy** as general superintendent of the communications and electrical department for Magnolia Pipe Line Co., Dallas. Levy has retired. Ashley has been assistant superintendent of the department since 1949.

DR. LAWRENCE A. KIMPTON, chancellor of the University of Chicago, and **F. CUSHING SMITH,** general manager of the supply and transportation department of Standard Oil Co. (Ind.), are two newly elected directors of Soind. Kimpton succeeds the late **Judson F. Stone;** Smith replaces **Dr. Robert E. Wilson,** who will retire Mar. 19.

A. R. WORRALL, formerly general manager of industrial chemicals, has been appointed managing director for all service and staff organizations at the Curtis Bay (Baltimore) works of Davison Chemical Co., a division of W. R. Grace & Co. **David P. Barrett** becomes general sales manager of industrial chemicals. He was formerly general manager of rare earths. Another newly named sales manager, **R. K. Hoddinott, Jr.,** has been put in charge of sulphuric acid and phosphate rock. He has been assistant sales manager of sulphuric acid since 1956.

PETROLEUM WEEK'S

Fingertip Figures



TOTAL DEMAND

Latest 4-week average	10.557
Year ago	10.141

DISTILLATE DEMAND

Latest 4-week average	3.479
Year ago	2.848

RUNS TO STILLS

Latest week	7.488
Previous week	7.560
Year ago	8.076

CRUDE PRODUCTION

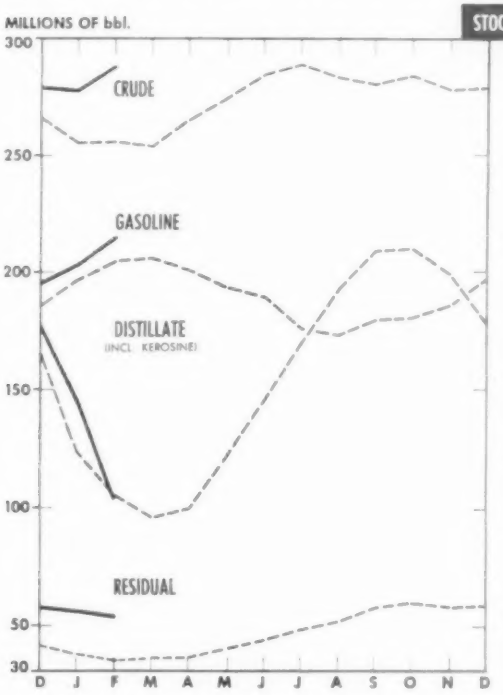
Latest week	6.328
Previous week	6.841
Year ago	7.813

TOTAL IMPORTS

Latest week	1.754
Previous week	1.712
Year ago	1.317

CRUDE IMPORTS

Latest week	1.052
Previous week	.927
Year ago	.747



CRUDE STOCKS

Week ended 3-1	288.0
Previous week	286.5
Year ago	253.7

GASOLINE

Latest week	215.4
Previous week	215.2
Year ago	205.8

DISTILLATES

Latest week	101.6
Previous week	105.8
Year ago	104.0

RESIDUAL

Latest week	54.8
Previous week	54.2
Year ago	36.4

If the industry could hold its operating rates for the remainder of March down to the levels of the first full week of the month, it would be well on the road to solving its economic problem.

As the figures at the left show, domestic crude production was off 513,000 b/d from the previous week as a result of the reductions in allowables that became effective Mar. 1. Refinery runs were down 72,000 b/d from the last week of February.

As of the first week of the month, operating rates finally are down to the level as suggested by PETROLEUM WEEK in mid-February (PW—Feb.14'58,p13).

But holding operating rates down may prove to be a big IF for the oil industry if past experience can serve as a guide. The industry all too frequently gets over-optimistic when even a slight improvement is indicated.

Demand in February ran ahead of a year ago, and, with a tight rein on supply, product stocks dropped substantially.

Distillates inventories are now 2.4-million bbl. below a year ago. But gasoline stocks, on the other hand, continue to run well ahead of a year ago. And gasoline yields so far in 1958 have been at record levels—averaging 50.0% on crude and blended natural gasoline.

Such a level is one-half of a percentage point higher than last summer's average—the seasonal peak demand period for gasoline.

Importers have shown no indications yet that they plan to aid in holding down the rate of new supply to a level in keeping with demand.

Last week's total imports were close to the all-time record—which was set in mid-February. Such import rates are in sharp contrast to the cuts in domestic crude output.

THOUSANDS
1957 --- 1958
ROTARY RIGS RUNNING
(U.S. AND WESTERN CANADA)
Latest week 2,013
Previous week 2,109
Year ago 2,665
Data: Hughes Tool Co.
D J F M A M J J A S O N D

The Market Trend

Prices: Mostly Easiness—but Some Strength

Price easiness still haunts the marketplace. The soft spots this week: East Coast distillates; Midwest distillates; West Coast residual; Gulf Coast gasoline.

Distillate prices continue to point downward along the East Coast. Barge prices for No. 2 fuel slipped 0.2¢, to 9.45¢, at New York harbor. Truck, trailer, and rack sales were off 0.25¢ in New Jersey. Spot barge buyers at Philadelphia feel they deserve all the privileges of their cargo-buying elders—they won't pay higher than 9.35¢.

Mid-Continent prices for No. 2 fuel eased 0.25¢, to 8.5¢, for Group 3 shipments. Further easing seems in the cards, too. All evidence indicates that Upper Midwest pipeline terminals are building their prices up from 8.25¢, Oklahoma. In Chicago, No. 1 and No. 2 (only recently firm because of cold weather and delayed barges) were down to 10¢ and 9.25¢, respectively, in trucks, both down 0.25¢.

Active competition for No. 6 sales at New York resulted in rack prices falling below prices for barge lots. No. 6 at the rack is generally posted at $2.70 in New York. But last week some suppliers increased their spot allowances to 10¢, for a net of $2.60. Prices for barge lots—which always used to be a higher echelon of supply—were a wavery $2.65.

Spot gasoline is weak all over, and particularly at the Gulf. Discounts of 0.5¢ (and in a few cases maybe up to 1¢) probably would bring out spot cargoes. A Mid-Continent refiner admitted to cutting below 11¢ on regular to hold an old (but straying) account. Chicago gasoline is being widely shaded by 0.25¢.

Fortunately, everything isn't gloom and doom for the sellers. Propane has had a splendid season. Texas pale and red coastal oils are firm. Term gasoline isn't available at anything like the cheap prices offered for spot. There isn't nearly so much distress residual in the Southwest. Light fuel oil stocks compare quite well with inventories a year ago and in 1956.

Cautious Buyers: Note that steel mill buyers didn't panic recently when the Ohio River froze over, cutting them off from barge shipments. They just sat still and burned up inventories. (When the river froze in 1947, the mills ordered hundreds of tank cars of residual, and paid heavily for emergency rail shipments.)

Caught Buyers: Some of the propane resellers did get caught short, however. A few spot sales were closed at 8¢, and even one or two at 10¢, Group 3. This compares with contract loadings that held unchanged at 5¢.

New Trend In Imports: It's getting steadily more important to watch the increased importation of products, both on the East Coast and in California. Last week, a cargo of naphtha unloaded on the West Coast, and another one is on the way. This week, a cargo of gasoline is loading in the Caribbean, destination California.

Gasoline shipments from the Persian Gulf and Venezuela to the East Coast soon will be a regular event. Also, a cargo of diesel oil is coming here from Italy.

The Market Place AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All prices as of March 10

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U. S. Gulf Coast, cargoes
- Gasoline, 98 oct prem. 12.25-14
- Gasoline, 92 oct reg. 10.5-12.375
- Kerosine 8.875-10.5
- Heating oil, No. 2 8.5-10.25
- Gas oil, 48-52 d.i. 8.625-10.5
- Fuel oil, bunker "C" $2.25-2.45

Caribbean, cargoes
- Avgas, Grade 100/130 16.5
- Gasoline, 93 oct research prem 10.75
- Gasoline, 87 oct research reg 9.875
- Gasoline, 79 oct research 9.125
- Gasoline, 70-72 oct motor method 9
- **Kerosine 9.125↑**
- Heating oil, No. 2 8.5
- Gas oil, 48-52 d.i. 8.625
- Fuel oil, bunker "C" $2.25

New York Harbor, barges
- Kerosine 10.35
- **Heating oil, No. 2 9.45↓-9.85**
- Fuel oil, No. 6 $2.65

Okla-Group 3, northern shpt, bulk
- Gasoline, 89 oct reg. 11.25-12.25
- Kerosine 9.75-10.25
- **Heating oil, No. 2 8.5↓-9.125**
- Fuel oil, No. 6 $1.10-1.40

Chicago, bulk
- Gasoline, 91 oct reg. 12-12.8
- **Heating oil, No. 2 9.25↓-10.65**
- **Fuel oil, No. 6 high sulfur 6.65-6.75↓**

Los Angeles, rack
- Gasoline, 88 oct reg. 11.9-13.6
- Diesel fuel, PS 200 10-11.25
- Light fuel, PS 300 $3.25-3.65
- Heavy fuel, PS 400 $2.70-3.05

Natural Gasoline, Grade 26-70
- FOB Group 3 4.5
- FOB Breckenridge, Tex. 4

LP-Gas
- Propane, Oklahoma (Group 3) 5

Penna Lubes
- Bright stock, 25 p.t. 26-27
- 200 vis. neutral, 25 p.t. 24-25

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent, 95 v.i. 24.5-26.5
- Neutral, solvent, 200-210 vis. 20.25-22.25

Gulf Coast Lubes
- Bright stock, solvent, 95 v.i. 24-26.5
- Neutral, solvent, 200 vis. 20.5-23

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes
- Avgas, grade 100/130 17.5
- **Gasoline, 79 oct research 9.875↓**
- **Kerosine 10.125↓**
- **Gas oil, 48 d. i. minimum 10↓**

KEY PRICES—CRUDE OIL

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- Mid-Continent, 36.0-36.9 2.83-3.07
- North Dakota, 36.0-36.9 3.07
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9 3.50
  - Gulf Coast, Upper & Lower, 26.0-26.9 3.07-3.22
  - West Texas, sweet, 36.0-36.9 3.00-3.07
  - West Texas, N. M., inter., 36.0-36.9 3.00
  - West Texas, N. M., sour, 32.0-32.9 2.86
  - East Texas, flat 3.25
  - Mirando, 28.0-28.9 3.31
- Illinois Basin, flat 3.00-3.15
- Pennsylvania Grade, Bradford dist. flat 4.40
- California, Signal Hill, 21.0-21.9 2.93‡
- North Louisiana-Arkansas, 36.0-36.9 2.92-3.02
- Wyoming sweet, 36.0-36.9 3.00
- Wyoming sour, 32.0-32.9 2.71

Canada (flat prices, at the well)
- Acheson-Stony Plain (Alta.) 2.68
- Leduc-Woodbend (Alta.) 2.74
- Redwater (Alta.) 2.63
- Daly (Man.) 2.46
- Smiley (Sask.) 2.40

Venezuela (Cargoes, FOB lifting port designated)
- Cumarebo, 48.0-48.9, Tucupido 3.75
- San Joaquin, 41.0-41.9, Puerto la Cruz 3.34
- Oficina, 35.0-35.9, Puerto la Cruz 3.05
- Tia Juana, Medium, 26.0-26.9, Amuay 2.55
- Bachaquero, flat, Amuay, Las Piedras 2.03-2.23
- Tarra, 38.0-38.9, San Lorenzo 3.08
- Lagunillas Heavy, flat, Amuay, Cardon 2.25-2.38

‡*Differential per deg. of grav. varies.*

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- Arabia, 34.0-34.9, Ras Tanura 2.08
- Safaniya, 27.0-27.9, Ras Tanura 1.79
- Iran, 34.0-34.9, Bandar Mashur 2.04
- Iran, 34.0-34.9, Abadan 1.99
- Iraq, 35.0-35.9, Fao 1.98
- Kuwait, 31.0-31.9, Mina-al-Ahmadi 1.85
- Qatar, 41.0-41.9, Umm Said 2.23

Middle East, Eastern Mediterranean
- Arabian, 36.0-36.9, Sidon 2.49
- Iraq, 36.0-36.9, Tripoli, Banias 2.49

Far East, Cargoes, FOB Lutong, Sarawak
- Seria Light, 37-38 2.75

KEY TANKER RATES

(Last paid, per long ton, single voyage)

U.S. Gulf-New York, clean (USMC —25%) $2.14↓
- U.S. Gulf-New York, dirty (USMC —32½%) $1.92
- NWI-USNH, dirty (USMC —52½%) $1.28
- NWI-UK/Cont., dirty (Scale —35%) 21/2*
- Persian Gulf-UK/Cont., dirty (Scale —50%) 30/2*
- Persian Gulf-USNH, dirty (USMC —70%) $3.81

*Sterling.

DEPT/Service & Equipment Companies

CLARK P. LATTIN, JR., has been elected a vice-president of Foster Wheeler Corp. and general manager of its process plants division, in New York. He formerly was manager of sales for the process plants division, which designs, fabricates, and constructs plants for oil refineries and chemical production.

C. P. Lattin, Jr.

L. H. Dean

LAWRENCE H. DEAN has joined J. B. Beaird Co., Shreveport, La., as manager of marketing research. He was formerly market research manager of the Forest Products division of Olin Mathieson Chemical Corp., in West Monroe, La.

I. TUNIS CORBELL has been named manager of microwave design engineering for General Electric's communications products department, in Syracuse, N. Y. Corbell, with GE since 1950, succeeds **A. Clarke Gunn,** who is now manager of design engineering for military equipment.

PETER H. TVESKOV has become assistant district engineer of machinery sales and service for U. S. Steel's Oil Well Supply Division, at Odessa, Tex. He joined the company at Graham, Tex., in 1956 as an engineer trainee. Field representative **Gene E. Hatton** transfers from Beaumont, Tex., to New Iberia, La.

ALLEN PIKE has been appointed manager of the newly created Venezuelan division, in Caracas, of BS&B International S. A., a wholly-owned subsidiary of Black, Sivalls & Bryson, Inc., Kansas City, Mo. Pike was formerly with Oilfield Sales & Service S. A., exclusive representatives for BS&B oilfield equipment in Venezuela. Branch offices of the new division are at Anaco, to serve Eastern Venezuela, and Maracaibo, to serve Western Venezuela. **Eugene L. Seale,** also formerly with Oilfield Sales & Service, will manage the former, and **James H. Clayton,** formerly with Automation Products, Inc., Midland, Tex., is manager of the latter. **Thomas Burkhead,** of BS&B's oilfield engineering department, will serve as sales engineer at Maracaibo.

VINCENT E. BOWES will take over as midwestern regional sales manager of Kelite Corp., manufacturer of industrial chemicals and steam cleaning equipment. Bowes, a petroleum service manager since 1957, will make his headquarters in Chicago. **Robert G. Hazel** and **George S. Johnson** are two newly appointed district sales managers for Kelite in Beaumont, Tex., and Indianapolis, Ind., respectively. Hazel was formerly a sales engineer; Johnson has been both a sales supervisor and sales engineer for the company.

RAYMOND CONCRETE PIPE CO., New York, plans to change its name to **Raymond International, Inc.,** because of the restrictive nature of its present name. The new name was chosen to describe more accurately the firm's operations abroad as a general contractor, undertaking all types of construction. After the name change, "Raymond Concrete Pipe Co." will operate as a division of the parent company.

CHRIS RING has been appointed manager, and **WILLIAM N. REESE** is in charge of technical services, for the newly expanded Southwestern Industrial Electronics division of Dresser A. G., European affiliate of Dresser Industries, with headquarters in Zurich, Switzerland. Ring and Reese, both were formerly with the SIE's Houston office. SIE manufactures electronic equipment and instrument systems.

"JUG" DAVIS has joined Brown Oil Tool Co. as a sales engineer, and has established a Brown service and administrative office in Dallas to serve the Dallas-Ft. Worth area. He formerly served a major oil company for ten years as engineer in the production department.

H. K. McARTHUR has been named vice-president and manager of the Texas Gulf Coast division of Welex, Inc., Houston.

E. R. Torgler

J. R. Harrahill

E. R. TORGLER moves up to the position of director of manufacturing, and **J. R. HARRAHILL** succeeds him as acting works manager, for Dresser Manufacturing Division, one of the Dresser Industries, in Bradford, Pa. Torgler will also supervise the industrial relations and personnel departments at Bradford. Harrahill, formerly assistant to the general manager of manufacturing and engineering, will be responsible for manufacturing in the Bradford and Wellsboro (Pa.) plants. Others newly appointed include **Charles Kuhn** as sales manager of regular products, and **Stephen B. Hodges** as director of marketing planning and control. Kuhn was formerly general sales manager of Hills-McCanna Co., Chicago. Hodges has been with Dresser since 1948, as assistant sales manager, regular products, and manager of marketing, regular products.

J. E. Massey

J. S. Perry

J. E. (Jap) MASSEY has been named chief engineer, and **JOHN S. PERRY** succeeds him as Houston district sales manager, for Delta Tank Mfg. Co. Massey, with the company since 1954, will move to Baton Rouge, La. Prior to joining Delta early this year, Perry served in sales capacities in both Houston and Tulsa.

ROBERT L. LOGAN, LAMAR F. KIRBY, and **ARTHUR H. BARNES** have been appointed district sales managers by Manning, Maxwell & Moore, Inc. Logan will take over the Mid-Continent district, Tulsa. Kirby, formerly a sales engineer, succeeds Logan in the southeast sales district, Atlanta, Ga. Barnes succeeds **E. H. Price** in the Pacific Coast district, Los Angeles. Price has retired.

HARRY R. KRAMP has been appointed vice-president and assistant general manager of Fred E. Cooper, Inc., Tulsa oil well servicing equipment firm. He joined the Tulsa office in 1956, and prior to this served as the company's southern division manager in charge of Texas, New Mexico, Louisiana, Mississippi, and Arkansas, with headquarters in Houston.

E. A. COLLE has been promoted to assistant manager of the Mid-Continent area, Tulsa, for Schlumberger Well Surveying Corp. **P. H. Hines** moves from location manager at Donaldsonville, La., to division engineer at Farmington, N. M. **F. Perkins,** former senior sales engineer at Wichita Falls, Tex., takes over as location manager at Lubbock, Tex. The former Lubbock district manager, **R. E. Hamilton,** has become senior sales engineer for the Permian Basin division, at Midland, Tex. Three new sales engineers are **F. E. Kendrick,** Laurel, Miss.; and **Van Maraman** and **V. J. Davis,** Wichita Falls.

PERCY TINSLEY will take over **James Whitaker**'s post as Near East representative of Christensen Diamond Products Co., with headquarters in Beirut, Lebanon. Whitaker will return to the U. S. after serving in the post for two years. Tinsley, former Gulf Coast area representative, will work closely with R. J. Eiche & Associates, Inc., Christiansen export representatives.

ROBERT L. MERRICK has become chief project engineer of Blaw-Knox Co.'s chemical plants division, Pitts-

burgh. This division provides engineering and construction services to the chemical, petroleum, and allied industries. Merrick was formerly president and general manager of Petrocon Engineering Co., Compton, Calif.

NORTHERN MUD CO., INC., Billings, Mont., and **Mountain Mud Co., Inc.,** Casper, Wyo., both distributors for Magcobar products, have merged under the name of Northern Mud Co., Inc. **Ernest Howell** of Billings remains as president of Northern, and **Ray Dillman** of Casper, former president of Mountain, is vice-president of the merged firm. General offices are in Billings, and a sales and service office is in Casper.

C. A. CALLAHAN, Majestic Contractors, Toronto, has been elected president of the Pipe Line Contractors Assn. of Canada at its fourth annual convention in Victoria, B. C. Other incoming officers include **Gordon W. Walker,** Mannix, Ltd., Calgary, first vice-president; **E. A. Hooper,** Sarnia, second vice-president; **A. O. Ackroyd,** Edmonton, executive secretary; **C. A. Wilkinson,** Marwell Construction, Vancouver, treasurer. New directors are Ackroyd; **R. G. Murray, Jr.,** Dutton-Williams, Ltd., Calgary; **Robert Thomas,** Ft. Worth, Tex.; **R. K. Banister,** Fulton Banister Co., Edmonton, the retiring president.

R. E. SKELTON will be in charge of the newly opened Woodward (Okla.) store for Bethlehem Supply Co. **D. G. Collins,** formerly store manager at Salem, Ill., and most recently machinery sales representative at Farmington, N. M., has been promoted to store manager and field representative at Farmington.

RAYMOND J. KENARD, JR., has joined Selas Corp. of America, Dresher, Pa., as sales representative in the Los Angeles sales district. He was formerly with Union Iron Works of California, Los Angeles, as sales engineer.

ROBERT L. WILLIAMS has been promoted to advertising manager of Gardner-Denver Co., Quincy, Ill. He has been in charge of advertising for the company's industrial products since May, 1957.

R. L. Williams

V. J. Carnell

VICTOR J. CARNELL has been named Midwest manager-sales engineer for Ever-Tite Coupling Co., New York. Carnell, formerly supervisor of the operations department of Esso Standard Oil Co.'s Pennsylvania division, will make his headquarters in Cincinnati.

DR. KAROL PILARCZYK has joined De Laval Steam Turbine Co., Trenton, N. J., as director of research and development.

Dr. K. Pilarczyk

Dr. L. V. Berkner

DR. LLOYD V. BERKNER has been elected a director of Texas Instruments, Inc., Dallas. Dr. Berkner is president of Associated Universities, Inc., New York, an educational institution sponsored by nine leading universities of the Northeast to establish and operate large research facilities that provide the academic community with access to advanced research devices.

ORRIE LUTTRELL will manage sales for Western Wireline Service, Bakersfield, Calif. He was formerly with BJ Service, Inc., as division salesman for the Pacific Coast.

RICHARD M. CHEWNING, vice-president, has been appointed general manager of the southern division of Republic Supply Co. of California. Another vice-president, **Glenn E. Pitts,** has become sales manager of the southern division. **Monroe S. Yunker** is the new manager of industrial sales, and **James C. Russell** manager of oil industry sales. **Charles B. Williams** will head the sales-service department.

LYLE L. GALBRAITH has been promoted from store manager and field representative at Abilene, Tex., to city sales representative at Midland, Tex., by Bovaird Supply Co. **J. C. (Clyde) Wilkinson,** field representative at Abilene, succeeds Galbraith as store manager there.

JAMES M. McALEAR will manage the new instrument sales division of Mason-Neilan, a division of Worthington Corp., Norwood, Mass. **H. P. Fishwick,** formerly a supervisor of sales and service engineering, succeeds McAlear as manager of the pulp and paper mill department.

J. A. CROWLEY has become manager of administrative engineering for M. W. Kellogg Co., New York, a subsidiary of Pullman, Inc. He was formerly manager of systems at Kellogg.

RUSSELL M. WHITE has been appointed general manager of the newly created international division of Stauffer Chemical Co., New York. He had been Pacific Coast manager of fertilizer promotion for the firm since January, 1955. The division has been established to increase coordination of the firm's present interests abroad and to permit more rapid expansion and development in the foreign field.

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PETROLEUM WEEK REPRESENTATIVES

Atlanta 3 — Douglas C. Billian, 1301 Rhodes-Haverty Bldg., Jackson 3-6951

Boston 6 — Edward A. Callahan, Jr., 350 Park Square Bldg., Hubbard 2-7160

Chicago 11 — W. F. Holbrook, F. R. Emerson, 520 North Michigan Avenue, Mohawk 4-5800

Cleveland 15 — J. E. MacArthur, 1164 Illuminating Bldg., 55 Public Square, Superior 1-7000

Denver 2 — J. W. Patten, Mile High Center, 1740 Broadway, Alpine 5-2981

Houston 25 — D. O. Hanson, 724 Prudential Bldg., Jackson 6-1281

Los Angeles 17 — Peter S. Carberry, 1125 W. Sixth St., Madison 6-9351

New York 36 — Edward A. Callahan, Jr., Donald R. Thompson, 500 Fifth Ave., Oxford 5-5959

Philadelphia 3 — W. A. Potter, 6 Penn Center Plaza, Rittenhouse 6-0670

San Francisco 4 — William C. Woolston, 68 Post Street, Douglas 2-4600

Tulsa 19 — J. A. Hartley, 909 Enterprise Bldg., 522 South Boston, Gibson 7-5594

England, London E. C. 4 — Herbert Lagler, McGraw-Hill Co., Ltd., 95 Farrington St.

AS THE EDITORS SEE IT

Only Drilling Will Boost Reserves

THE OIL INDUSTRY, accustomed as it is to sobering statistics, is being given some hard-to-digest data this week.

The story on page 11 shows that both exploratory drilling and the nation's proved reserves of oil declined significantly last year—the first major drop since 1933.

In addition, the actual discovery rate in 1957 was the lowest in the postwar years, declining to 10.7 bbl. of new reserves for each foot drilled in strict wildcat tests (table, below), based on the tabulations of the American Assn. of Petroleum Geologists and the American Petroleum Institute.

THIS LOW POINT in exploratory activity came in a year when demand for U.S. crude was at an all-time high. The situation is made to order for the prophets of doom—those who have been predicting since before 1900 that the U.S. was running out of oil.

And it's made to order for several other schools of thought, too. Domestic producers, armed with these latest data can prove a strong case that imports are seriously damaging the U.S. oil reserve position.

On the other hand, importers can argue with equal strength that the oil-finding rate in the U.S. is such that even greater imports are needed.

The statistics alone prove rather conclusively the need for incentives, such as percentage depletion, to encourage exploratory drilling.

WHAT THEN IS THE FUTURE COURSE for the U.S. oil industry? Obviously it can't continue with the status quo and survive for long. Nor can it turn to imports to supply the largest share of U.S. oil requirements.

And it is becoming quite obvious that U.S. producers can't hope to find enough oil to supply the full demand.

Otis H. Ellis, spokesman for the National Oil Jobbers Council, said last week that "by 1965, we'll be thanking God for foreign oil."

That may be the case. It certainly will be true if the industry tries to drown itself in a flood of foreign oil. But at the same time, domestic producers need to discard their crying towels and face up to reality.

A cut in imports will not solve all of the industry's ills. Nor will an unrealistic number of development wells provide a substitute for the urgently needed increase in exploratory drilling.

Year	Total New Oil Found in U.S. (bbl.)	New Reserves per Foot of Strict Wildcats (bbl.)	U.S. Crude Production (b/d)	Crude Imports (b/d)
1946	244,434,000	19.5	4,750,500	235,800
1947	445,430,000	30.5	5,087,600	267,200
1948	396,481,000	21.2	5,519,600	352,700
1949	890,417,000	49.0	5,046,400	421,100
1950	564,916,000	25.5	5,407,000	486,900
1951	389,256,000	13.9	6,158,100	490,600
1952	496,428,000	15.3	6,256,400	572,600
1953	591,680,000	17.5	6,457,800	647,800
1954	585,806,000	16.5	6,342,400	656,100
1955	476,957,000	12.2	6,806,700	782,000
1956	467,222,000	11.1	7,151,400	934,000
1957	416,197,000	10.7	7,175,000	998,000

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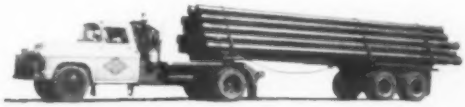

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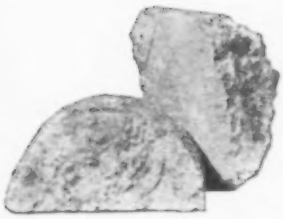


MISSISSIPPIAN CHERT

Kay County, Oklahoma

Responds well to Sandfrac*. Typical treatment: 750 gals. refined oil per foot of pay, and 1½-2 lbs. sand per gal. Injection rate: 30 BPM. Petrojel* successful but use limited by lease crude storage cost. Excellent results with Riverfrac*, but water shortage limits its use here.

YATES

West Texas — New Mexico

In certain areas, such as Shafter Lake Field, Andrews County, Texas, Riverfrac has been successful in many wells after all other treatments had failed. Typical treatment this field: 35,000-40,000 gals. fresh water, 20,000 lbs. sand. Injection rate: above 25 BPM recommended.

"D" SAND

Denver — Julesburg, Colorado

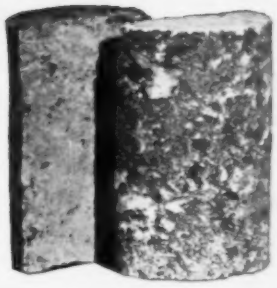
BHT frequently exceeds 225° F. Sandfrac, using refined oil, preceded by Mud Acid, generally used. Results vary widely, depending on degree of depletion. Typical treatment: 400 gals. Mud Acid, 10,000 gals. oil, 10,000 lbs. sand. Injection rates: 5-10 BPM through tubing, 10-20 BPM through casing.

LOWER FRIO

South Texas

Treatment of tight intervals depends mainly on depth and bottom hole temperature. Petrofrac* recommended for shallow wells with BHT under 150° F; Petrojel where BHT range is 150° F—180° F. In deep, high BHT wells, Stratafrac* or Acid Petrofrac* gives excellent results.

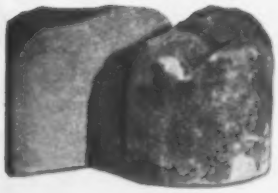
Dowell guide to fracturing



MISSISSIPPIAN CHAT

Barber County, Kansas

This formation, although only slightly soluble in acid; responds well to Acid Petrofrac. Typical treatment: 1,000 gals. fluid and 1,000 lbs. sand per foot of perforation. Injection rate: 30 BPM. Results on gas wells generally ten times drill stem test.



TENSLEEP

Big Horn Basin, Wyoming

Tight Pennsylvanian Sandstone, usually requiring high injection pressures. Normal treatment is down tubing. Widely varying depths and BHT. Petrojel successful in shallower sections where BHT is under 180° F; Sandfrac, using refined oil, preferred in deeper wells with higher BHT.

CARDIUM CONGLOMERATE AND SAND

Pembina Field, Alberta

Conglomerate interval normally prolific without stimulation. Sand usually requires fracturing. Sandfrac, preceded by Mud Acid, gets good results. Typical treatment: 500 gals. Mud Acid followed by 20,000-30,000 gals. lease crude with 40,000 lbs. sand. Injection rate: 20-30 BPM.

These cases give general information about treatments which have been successful in the formations shown. However, each well has its own unique characteristics which require the attention of experts. Dowell engineers have gathered performance data from fracturing operations in most active fields in the United States and Canada. Chances are that they already have the answer to your particular treating problem. If not, the Dowell laboratory and engineering staff is at your service. Dowell Incorporated, Tulsa 1, Oklahoma.

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